DETROIT PUBLIC LIBRARY DEC 9 1959

SOCIAL SCIENCES

WHO CHRONICLE

VOL. 13, No. 11 - NOVEMBER 1959

A new epoch in tuberculosis

Live vaccines for poliomyelitis

The economics of sewage disposal

Trachoma control in Europe

Basic planning in health education

Hygiene and sanitation in aviation

Social psychiatry and the community

WORLD HEALTH ORGANIZATION
PALAIS DES NATIONS
GENEVA

The World Health Organization (WHO) is one of the specialized agencies of the United Nations. Through this organization, which came into being in 1948, the public health and medical professions of more than 80 countries exchange their knowledge and experience, and collaborate in an effort to achieve the highest possible level of health throughout the world. WHO is not concerned with problems which individual countries or territories can solve with their own resources. It deals, rather, with problems which can only be satisfactorily solved through the co-operation of all, or certain groups of, countries—the eradication of diseases such as malaria, the control of cholera, plague, yellow fever, smallpox and rickettsiosis. Progress towards better health throughout the world also demands international co-operation in many other activities : for example, setting up standards for biological substances, for insecticides and insecticide spraying equipment ; compiling an international pharmacopoeia ; drawing up international sanitary regulations ; revising the international lists of diseases and causes of death ; assembling and disseminating epidemiological information ; recommending non-proprietary names for drugs ; and promoting the exchange of scientific knowledge. In many parts of the world, there is need for improvement in maternal and child health, nutrition, nursing, mental health, environmental sanitation, public health administration, professional education and training, and health education of the public. Thus a very large share of the Organization's resources is devoted to giving assistance and advice in these fields to countries and territories whose health services are in an early state of development and which are therefore weak points in the common front against disease.

- ***WHO Chronicle***

  (formerly *Chronicle of the World Health Organization*), published by WHO for the medical and public health professions, provides a monthly record of the principal health activities undertaken in various countries with WHO assistance. It also contains summaries and detailed accounts of the other publications issued by the Organization.
  The Chronicle is published in English, French, Spanish, Russian and Chinese.

- ***Bulletin of the World Health Organization***

  contains technical articles, in English or French, contributed by physicians and scientists engaged in public health work. It appears monthly and each issue runs to about 200 pages.

- ***World Health***

  an illustrated magazine for the general public, aims at giving an idea of WHO activities throughout the world and at showing some of the more striking aspects of public health work.
  This publication appears every two months in English, French, Spanish and Portuguese.

Other WHO publications: the *Technical Report Series*, the *Monograph Series*, the *Epidemiological and Vital Statistics Report*, the *International Digest of Health Legislation*, etc., are described in a catalogue which can be supplied free of charge on request.

Material from this publication may be reproduced in full or in part, provided that the reprinted text is accompanied by the following acknowledgement: (WHO Chronicle).

WHO CHRONICLE

VOL. 13, No. 11 - NOVEMBER 1959

397 *A new epoch in tuberculosis*

402 *Live vaccines for poliomyelitis*

406 *The economics of sewage disposal*

411 *Trachoma control in Europe*

413 *Basic planning in health education*

417 *International work in health statistics — 5*

421 *Hygiene and sanitation in aviation*

422 *Social psychiatry and the community*

425 *Notes and news*

428 *People and places*

431 *Review of WHO publications*

WORLD HEALTH ORGANIZATION

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

PRINTED IN SWITZERLAND

A NEW EPOCH IN TUBERCULOSIS

The new situation created by the advent of potent antituberculous drugs—first streptomycin in 1944, then PAS and isoniazid—has come upon the world almost unawares, and the profound implications it carries are only just beginning to be grasped. For millions of people throughout the world there is now hope of recovery, whereas previously there was none. The medical profession too is now faced with a change in methods of treatment and prevention of tuberculosis that may alter its approach to problems of control. These conclusions emerge from two extensive investigations carried out by WHO in co-operation with a number of agencies and government authorities in India and Denmark. The following accounts are based on the full reports published in a recent WHO Bulletin.[1]

In advanced countries

Until about 15 years ago, the prospects for the control of tuberculosis could hardly be called promising, even in advanced countries. Control of the disease depended on improvements in living standards, and medical treatment, based essentially on the sanatorium, was designed to provide the patient with the optimum environmental conditions for recovery. But the sanatorium did not cure him: it was merely a means of removing him from an environment in which he was a perpetual danger to those around him, and of giving him what as a rule he lacked—an adequate diet and plenty of fresh air and rest in bed. Nor did collapse therapy or surgery seek to do more than give the patient a better chance to recover on his own, if indeed he did recover. Tuberculosis was felt to be a disease that would persist as long as living conditions were anywhere less than good, and at least pockets of infection were therefore thought to be inevitable for the foreseeable future.

Nevertheless, the mortality rate in tuberculosis has declined steadily in the past hundred years in the advanced countries. This change for the better has been attributed to rising standards of living, less malnutrition, better housing, less overcrowding, improved sanitation, and the greater availability of medical facilities. Now that the treatment of tuberculosis is effective and relatively standardized, is it possible to envisage the reduction of the mortality rate to zero or even the complete eradication of the disease from the community in these advanced countries?

The ideal country in which to seek an answer to this question would be small, homogeneous in its population and its characteristics, well equipped to conduct an inquiry, and unlikely to be swamped by the multitude of cases met during the investigation. Such a country is Denmark, already ahead of most countries in its tuberculosis services. The incidence of tuberculosis, a recent visitor to Denmark remarks, has fallen faster and further there than in England and Wales. This he attributes *inter alia* to a more centralized system of control, suited to a small country but hardly practicable in a large one.[2]

Tuberculosis morbidity and mortality rates in Denmark have been among the lowest in the world for some decades. This is generally believed outside Denmark to be due to the extensive use of BCG vaccination, but in fact BCG was used for the first time on a large scale only in the years 1948-1952, by which time the annual mortality rate from pulmonary tuberculosis was already down to about 12 and the annual morbidity

[1] *Bull. Wld Hlth Org.*, 1959. **21**, 5, 51

[2] Franks, H. (1959) *Brit. med. J.*, **2**, 87

rate to about 60 per 100 000. As late as the end of 1947, only 5-10% of the population had been vaccinated. After that, however, it became the accepted practice to vaccinate all tuberculin-negative children when they entered school at the age of 7. The incidence of pulmonary tuberculosis for Copenhagen and the rest of Denmark in the years 1920-1957 is shown in Fig. 1, and the mortality from all forms for the same period in Fig. 2. As will be seen from Fig. 1, the incidence of pulmonary tuberculosis is high in Copenhagen as compared with the rest of the country.

In 1950 the Danish Tuberculosis Index was established as a co-operative undertaking of the National Health Service of Denmark and the WHO Tuberculosis Research Office in Copenhagen, and it was responsible for the technical direction of the mass campaign which took place in 1950-

FIG. 1. INCIDENCE OF PULMONARY TUBERCULOSIS, PER 100 000, PER YEAR, BY SEX, IN DENMARK, 1920-1957

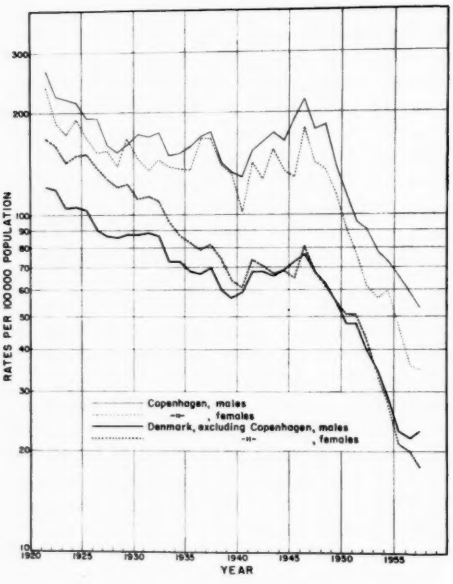
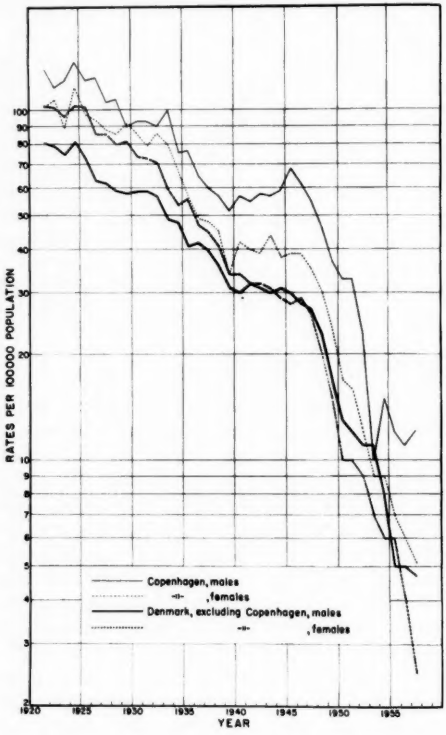


FIG. 2. MORTALITY FROM ALL FORMS OF TUBERCULOSIS, PER 100 000, PER YEAR, BY SEX, IN DENMARK, 1920-1957



1952. The entire country was covered by the campaign, except for certain areas where campaigns had already been carried out. Tuberculin tests, X-ray examinations and vaccinations were performed by specially trained teams, the co-operation of the county chest clinics being enlisted. Uniform and exact procedures for the examinations and for writing and handling the records were devised. Pre-school children and the adult population aged 15-34 were individually invited to come for a tuberculin test, a photofluorogram of the chest, and BCG vaccination if indicated. Persons over 35 were not individually invited, but were informed

through the radio and the press that they were welcome to attend for examination. Schoolchildren were not invited because since 1949 they were being tuberculin tested and vaccinated at school. Great care was taken to ensure that the tests were properly read, and the X-ray films were double-checked. The records were kept on special cards, later transferred to punch cards, and finally assembled into three main card files in the office of the Danish Tuberculosis Index. Special precautions were found to be necessary at all stages, since experience had shown that continuous close supervision and frequent repetition of instructions were very necessary for both the field and the central office personnel. Particular attention was paid to the size of the tuberculin reaction, not only because it enabled a distinction to be made between positive and negative reactors, but also because its size was found to be related in young persons to the risk of contracting active tuberculosis later.

The census population is fairly well represented numerically by the population examined in the age-group 15-45. Above the age of 45, however, only about 12% of the census population was examined. Follow-up studies in the first three years after the campaign show, however, that the group examined is representative of the general population in respect of the prevalence of tuberculosis. As was expected, the percentage of unvaccinated positive reactors increases with age, sharply in men, less sharply in women. Only a small proportion of these had suspicious shadows in their chest X-rays, but the follow-up studies show that this is the group which is especially liable to develop active tuberculosis. Among the 795 000 adults examined 503 previously unknown cases of active pulmonary tuberculosis were found—a rate of one case per 1500 examined. The unvaccinated, tuberculin-positive population comprised less than half of the total population examined, but contributed nearly 90% of the active cases found, the rate being considerably higher in women. Relatively few cases were found in the campaign among young persons, relatively many among older persons.

During the 3½-4 years of the follow up 878 new cases of tuberculosis were diagnosed in the population classified as healthy at the time of the mass campaign; of these, 742 had the pulmonary form. All of the 17 deaths occurred in unvaccinated tuberculin-positive individuals. In this group, too, the case rates among adults are 5-8 times higher than those for comparable ages in the group vaccinated during the campaign. On the whole, the age-group 15-24 shows the highest incidence of tuberculosis during the follow-up period. In respect of this age-group, it may be said that, if the risk of those vaccinated in the campaign is taken as unity, the risk of unvaccinated tuberculin-positive reactors is eight times as great ; and of persons vaccinated before the campaign twice as great. It follows that the major source of infection in the entire Danish population must be the unvaccinated tuberculin-positive reactors; indeed, 76% of all new cases appeared in this group.

This group can be divided into those whose lungs appear normal on X-ray and those whose lungs have suspicious shadows. For the person with normal lungs, the average annual case rate of tuberculosis for all ages is only 27 per 100 000, but for those with suspicious shadows the case rate is 370, which is almost 14 times as great. The latter represent less than 0.5% of the total healthy population, but run an extremely high risk of contracting the disease. They can be classified as persons with definite lung lesions, probably of tuberculous origin ; persons with definite lung lesions, probably not of tuberculous origin; persons with questionable shadows in the lung field; and persons with definite or questionable pathological lesions in the pleura or hilum. The individuals with definite lung lesions of probable tuberculous origin form a major risk group. These individuals have a tuberculosis case rate 76 times greater than that of the minimal risk group, those whose photofluorograms were read as normal.

The situation revealed by the mass campaign and by what information was available on those portions of the population of Denmark not examined is that approximately

60% of the entire adult population has had a natural tuberculous infection, and that 85-90% of new cases arise from that section. From the same section, however, can be isolated a major risk group of about 1200 persons who can be identified by the tuberculin test and X-rayed and who are mainly responsible for the new cases.

The authors of the report conclude from this situation that the time has come in Denmark for a review of traditional methods of tuberculosis control. These methods, based on the constant X-raying of as many of the population as possible, have been effective in the past, but now require to be brought into line with present knowledge of foci of infection in the population and recent developments in treatment. Already in Denmark routine X-raying of children has been abolished, and in some areas routine BCG vaccination of infants and children will be abolished until the last year of school. The tuberculin test can then be used every year to find the few children who have already had natural infections and the even smaller number who will become infected in the future. The enormous numbers of routine X-rays now being taken can be drastically reduced. Older persons with normal photofluorogram findings need not be recalled for examination year after year. But persons of any age with suspicious lesions and young persons with large tuberculin reactions should be followed up systematically. These high-risk groups form such a small percentage of the population that continuous and close supervision is practicable. The stage has thus now been reached in Denmark, and obviously in other advanced countries as well, when attention can be focussed on the small proportion of people who run the greatest danger of contracting tuberculosis. The disease can then be detected at an early stage and treated effectively before it is allowed to spread. In this way it may be expected to decline with increasing speed towards vanishing point.

In the less developed countries

In the less developed countries the situation with regard to tuberculosis is far from being as promising as it is in the more advanced countries. Social and economic conditions favour the spread of the disease, and hospitals and sanatoria are too few to cope with the numbers of patients who require treatment. There is no question in these countries of confining attention to high-risk patients only ; the problem is rather one of trying to make some impression on the disease with woefully inadequate staff and resources. In India, for example, the number of tuberculosis beds is 23 000, but the number of infectious cases has been estimated variously at 2½ and 1½ million. Any development in treatment that would lessen the demand for sanatorium beds must therefore be welcomed.

An attempt has been made in India to compare treatment at home with treatment in a sanatorium. The study was undertaken by the Tuberculosis Chemotherapy Centre, Madras, which was set up in 1956 under the joint auspices of WHO, the Indian Council of Medical Research, the Madras State Government, and the Medical Research Council of Great Britain. Most of the patients came from the poorest sections of the population of Madras City, and for inclusion in the study had to satisfy certain conditions; for example, they had to be over 12 years of age, have had no previous treatment with drugs (or not more than two weeks of treatment), have sputum positive for tubercle bacilli, be prepared to co-operate, and live in a specified area. Certain patients were excluded, such as those who were too ill for home treatment, or had leprosy or other serious diseases, or were pregnant. In all 193 patients were selected, and allocated randomly, 96 to home treatment, 97 to sanatorium treatment.

The patients were given isoniazid and the sodium salt of para-amino-salicylic acid (sodium PAS), the form, prescribed dosage and schedule of administration being the same both at home and in the sanatorium. The majority of home patients attended the Centre once weekly to collect supplies of medicine ; in addition, a visit was paid to their homes at intervals—rarely less than twice a month—to deliver sputum specimen

bottles and to collect specimens of urine. They were encouraged to rest when ill, but to return to work when fit to do so. Otherwise, they continued to live in their poor and overcrowded homes as they had been accustomed to do, and most of them were ambulant for much of the time. By contrast, those in the sanatorium had the advantage of rest, good nursing, good accommodation, supervised administration of medicine, and a good diet.

The comparison lasted a year, and the patients were carefully assessed medically, radiographically, and bacteriologically before, during, and after the study, double checking being employed to ensure that the assessment by X-ray was thorough. Although the procedure for random allocation of treatment was rigorously observed, the two series were later found to have differed by chance in important radiographic and bacteriological respects before the start of treatment; but the general conclusions are not affected by this.

The most important finding was that, even though the males treated at home were at an initial disadvantage radiographically and bacteriologically, there was little to choose between them and those treated in the sanatorium over the 12-month period. The sanatorium patients gained much more weight, as might have been expected, and the response of the erythrocyte sedimentation rate was greater. But the most important responses, the radiographic and bacteriological, were at most only slightly in favour of the sanatorium patients. At the end of the period 10% of the patients, both at home and in the sanatorium, had bacteriologically active disease, assessed on the basis of very stringent criteria.

Radiographically and bacteriologically, the females treated at home were in poorer condition than those in the sanatorium, and this makes it less easy to interpret the results. If allowance is made for pre-treatment differences by statistical standardization, the response to treatment is radiographically similar, but the females treated at home responded less well bacteriologically. Nevertheless, the conclusion reached is that the difference between the response to treatment at home and in the sanatorium of females in a similar clinical condition is small.

These satisfactory findings were obtained in home patients even though most had major lesions and many had unfavourable clinical features at the start of treatment. It seems likely that if the disease could be diagnosed at an earlier stage, either by mass radiography or by persuading the people to come earlier for examination, the results of treatment at home would be even better. They might also be better if the drug combination were changed when patients appeared unlikely, as judged by the persistence of positive sputum, to respond to isoniazid and PAS in the quantities prescribed.

Another important finding was that patients at home co-operated excellently. When the study was being planned, the general consensus of opinion both in India and Europe had been that it would be very difficult to obtain the co-operation of a high proportion of patients in treatment at home, even for as long as 3 months, but that patients would welcome sanatorium treatment. Not only was this view about patients at home proved to be wrong, but it was actually found extremely difficult to persuade patients to remain under sanatorium treatment for a long period of time.

The general conclusion reached is that on the whole it is possible to obtain good results from treatment at home for at least a period of 12 months. Provided therefore that it can be shown that relapse is infrequent and that there is no special risk to contacts, there may be nothing much to gain from admitting the general run of patients to a sanatorium. Selected cases would still require hospitalization if, for example, they were seriously ill. The experience of the Centre also suggests that certain minimum facilities are necessary for the organization of a satisfactory domiciliary service based on a tuberculosis clinic: an adequate supply of drugs, alternative drugs for patients who do not respond satisfactorily, enough supervisory staff, including a social worker and a public health nurse, an efficient appointment system, sufficient transport, a small number of hospital beds

for special or emergency cases, a suitable laboratory, and the resources to give at least limited financial assistance in case of particular need. The medical care given during this study was obviously of a higher standard than could be expected to be provided in many other parts of the world, but in spite of this the conclusion reached is of the greatest importance, for it carries implications that place the whole question of the treatment of tuberculosis in the less developed countries in a new light.

LIVE VACCINES FOR POLIOMYELITIS

The development of an inactivated poliomyelitis vaccine by Salk is generally recognized to be an important step towards the control of the paralytic form of poliomyelitis. However, most infections with poliovirus do not result in paralysis: there are large areas throughout the world where infection is widespread, but paralysis is rare; and indeed in all areas the proportion of paralytic to symptomless infections is low. In the areas of rare paralysis the balance between infection and immunity is almost as favourable as has been achieved by artificial means in any other infectious disease. The reason for this appears to be that the virus of poliomyelitis multiplies readily in the alimentary tract of infants and young children, and at this age symptoms follow infection less frequently and are usually less severe than when primary infection occurs in older children and adults; thus the balance between infection and immunity depends on the dissemination of relatively avirulent viruses among children at an early age.

Theoretically, oral administration of live attenuated poliovirus at an early age would reproduce this situation. However, the vaccine virus administered is excreted in the stools and may infect others. Obviously, therefore, the dissemination of live viruses, which in practice is what oral vaccination would amount to, even though the viruses were shown in the laboratory to be of low virulence, is not a measure to be undertaken lightly, since the virus excreted by the vaccinated person may be of increased virulence. The WHO Expert Committee on Poliomyelitis which met in July 1957,[1] after reviewing the information available on the use of live attenuated polioviruses as immunizing agents, felt that their value should be further tested by controlled field trials. It was not the Committee's intention that live vaccine should replace inactivated virus where the latter is in use or is about to be used, but rather that it should supplement it or take its place where its use is not feasible. The trials should therefore take place within certain specified population groups and areas and under the careful supervision of an experienced person with adequate time and facilities at his disposal; the strains of virus used should be selected with the utmost care; and their properties should be measured in a number of different laboratories as a multiple check on pathogenicity. Furthermore, careful studies should be done on the characteristics of the viruses excreted.

A number of trials have now, with WHO encouragement, taken place through the world, and in June 1959 the present situation was assessed by a Conference on Live Poliovirus Vaccines which was held in Washington, D.C. This Conference was convened by WHO and the Pan American Sanitary Bureau, which acts as its Regional Office for the Americas, and financial assistance was given by the Sister Elizabeth Kenny Foundation.

The Conference recognized the value of the inactivated vaccine in the prevention of paralytic poliomyelitis, and recommended that its widespread use should be continued. It is, however, generally admitted that there are limitations to its use in many parts of the world, and that it does not prevent the dissemination of wild polioviruses, which constitutes a hazard to non-vaccinated per-

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1958, 145

sons. There is, therefore, a place for a vaccine that may be of lower cost, simpler to use, and potentially capable of giving greater protection to the community. A vaccine that can be administered orally has obvious merits. Further, there is the possible advantage that such a vaccine virus might replace wild viruses in nature, thus eliminating the threat of paralytogenic strains.

The Conference recognized, however, that the use of a product which spreads beyond those originally vaccinated represents a radical departure from present practices in human preventive medicine.

The very difficult problems that arise in the development, control, and evaluation of the safety and effectiveness of experimental live attenuated poliovirus vaccines were the main concern of the Conference.

Properties of attenuated polioviruses used as oral vaccines

The vaccine strains reported upon at the Conference were generally agreed to be of low virulence for primates. It was apparent, however, that the results obtained on inoculation of monkeys by different investigators varied considerably—a circumstance attributed by some participants to differences in technique and, perhaps, in animal susceptibility. The desirability of standardizing techniques was emphasized.

Hitherto the criteria of attenuation have depended upon a reduction in the neurovirulence of the virus for monkeys, and, indeed, the strains under study have been selected on this basis. However, several participants expressed the need for the study of properties other than neurovirulence which might be used as additional evidence of the safety of vaccine strains. Among these properties are the degree of invasiveness in vaccinated persons, as shown by the development of viraemia, the genetic stability of the virus in the course of its multiplication in man, and the degree of spread from vaccinated to non-vaccinated contacts.

Two reports presented to the Conference indicated that there was a considerable difference in the degree of neurovirulence between the three sets of strains studied, as demonstrated in comparative tests by both intracerebral and intraspinal inoculation of monkeys. The differences were particularly apparent in the case of monkeys inoculated intracerebrally.

Recent investigations suggest that the study of genetic "markers" related to virulence may prove very useful. It was emphasized that more work should be done with these new markers.

Properties of polioviruses excreted by vaccinated persons

Several investigators had compared the properties of the vaccine virus with those of the virus subsequently excreted. As low neurovirulence in monkeys, that is to say, an absence of effect after intracerebral inoculation and a low degree of activity by intraspinal inoculation, was the criterion for selecting the strains in the vaccines, this property was regarded by many as the most important measurable index of change of the virus in the course of multiplication in the human alimentary tract. Evidence that there was reversion towards increased monkey neurovirulence in the virus excreted after vaccination had been obtained by several workers in different countries. However, in the studies reported, there was no evidence of progressive increase of neurovirulence in monkeys during prolonged multiplication in the vaccinated individual or after serial passage of the virus in human beings.

Encouraging results were reported with certain recently described genetic markers of polioviruses. These markers could be used for detecting altered strains of greater neurovirulence than that of the vaccine virus itself. More work is needed on this subject because of the importance of differentiating excreted vaccine strains from wild strains of poliovirus.

Field studies

More than 20 field studies from no less than 15 countries were reported at the Conference. Some have been organized

in populations already partly vaccinated with the inactivated vaccine. Most, however, have been done in highly susceptible populations which had not been given inactivated vaccine.

Both small and large-scale studies have usually involved the sequential feeding of children up to 12 years of age or so with the three types of attenuated poliovirus, but in some of the most recent studies the simultaneous administration of all three types has been done, with apparent demonstration of immunization to all of them. Following this oral vaccination, there has usually been a period of surveillance lasting several months, in which both vaccinated persons and their associates have been kept under fairly close observation. In the larger studies, serological investigations have been done on selected samples of the population, and surveillance for illnesses after vaccination instituted, this taking different forms based more or less on existing local public health procedures for detecting illness of any kind in the community at large. In some of the studies where a large segment of the population has received the vaccine, attempts have been made to estimate the paralytic poliomyelitis rate in the vaccinated, as compared with the unvaccinated, group. This is admittedly a procedure difficult to interpret, particularly from a statistical standpoint.

The studies designed to test the efficiency of the vaccine have yielded different results in different environments. For instance, on the basis of the antibody response of vaccinated children who lacked antibodies before vaccination it was reported in some studies as being only 50-60% effective, in others as about 90-100%. The antibody response depends on the successful establishment of alimentary infection, and evidence was produced to suggest that agents which interfere with this alimentary infection will limit the development of immunity.

The antibody response of the newborn, of children of varying ages, and of adults, including pregnant women, has been studied. In general, the response in infants and children is better than in adults. The immune status of the individual prior to vaccination obviously has an important bearing on it. The dose of the vaccine also influences the development of immunity.

The role of interference received much attention in the Conference. Some viruses found in the alimentary tract, as well as other polioviruses, may prevent infection with the attenuated vaccine virus from becoming established. It was clear that this is a problem which demands much more study.

Little is known about the role of other enterovirus infections in enhancing the invasiveness of attenuated polioviruses.

Earlier reports had suggested that, if all three types of polioviruses were administered simultaneously, there was interference between them. However, recent studies have shown that when a higher dosage of each virus type is used in a trivalent preparation or when the preparation is fed more than once the results are at least as good as, or are better than, those achieved by feeding the strains consecutively.

The degree of spread of infection to contacts of those vaccinated varies considerably in different situations, but in families and in closed institutions spread is common. In countries with a low degree of natural immunity in childhood considerable spread may occur in the non-vaccinated population. On the other hand, in communities where immunity is acquired at an early age the spread of the vaccine virus appears to be restricted. It has not been possible to follow clearly the natural spread of attenuated poliovirus after its first or second passage.

Since the development of these vaccines, each has been widely used under a great variety of circumstances. Studies of great magnitude involving the administration of vaccine to communities of hundreds of thousands of persons have been reported from Africa, Asia, Europe, and Latin America, and two trials involving several millions from the USSR. Smaller, and therefore more carefully controllable, studies have been reported from Europe and the United States. The degree of thoroughness with which orally vaccinated persons and their contacts have been observed for evidence of adverse effects has varied greatly in differ-

ent studies; however, no evidence has been produced that the use of any of the vaccines has been followed by either paralysis or ill-defined illnesses in either group greater in amount or number than has been observed in a control group or in the community at large among non-vaccinated persons.

Although they have uniformly shown significant increases of antibody for all three types of virus, and therefore a presumed protective value for the vaccine, few of the studies have been conducted under conditions which made it possible to shed light on the value of the vaccine in preventing paralysis. This has not been due to defects in the studies, but rather to the known low attack rate of paralytic poliomyelitis, the extreme variability in the occurrence of the disease, and the short time that has elapsed since the vaccines have been administered. In most of the studies, therefore, there has been no attempt to assess effectiveness other than by measurement of the increase in antibody. In a few instances, however, it has been claimed that use of the vaccines was followed by low rates of poliomyelitis, either in those vaccinated or in the community, which were consistent with those that might have been expected as a sequel to the use of an effective vaccine. Conversely, no increased or continued high incidence of poliomyelitis has been reported which would indicate ineffectiveness of the vaccine. While there are certain differences of opinion as to the interpretation of the results, there is general agreement that more studies and longer periods of observation are required before any definite conclusions can be reached on the value of the vaccines in preventing paralysis. However, taking into account present knowledge of the immunology and pathogenesis of poliomyelitis, the Conference agreed generally that it was reasonable to assume that the vaccine was effective if virus was excreted and there was an antibody response.

The "unskilled worker"

In the internationally assisted mass BCG vaccination programme, in which about 300 million people have been tuberculin tested and about 120 million vaccinated, practically all tuberculin tests have been performed and read and the vaccinations have been done by so-called "technicians" who for all practical purposes can be compared with the unskilled worker in industry.

During the last few years WHO has devoted much effort to finding ways in which much of the work involved in the different stages of a tuberculosis control programme can be broken down into simple routine manipulations from which practically all subjective judgement is excluded and which involve only simple decisions consisting of a choice between a few clearly defined possibilities, this choice being based on objective facts. This effort has to a great extent been successful, and it is therefore possible to visualize a programme in which a large part of the work is performed by technicians. Practical experience has shown that when well-standardized methods and techniques are used technicians perform the daily routine work in as reliable a manner as professional staff.

THE ECONOMICS OF SEWAGE DISPOSAL

From the most distant past, men have tended to form themselves into groups for their own protection. Paradoxically enough, something once done to preserve life has led to a series of disasters, in particular the great epidemics caused by the insanitary conditions of the earlier urban communities. This situation led in time to the development of measures to improve sanitation, empirical at first, later based on solid scientific knowledge. The phenomenal progress made in the conquest of disease during the past 100 years, and particularly in the present century, has been solidly based on the foundations of sanitation—the provision of adequate supplies of good water, and the safe disposal of sewage and trade effluents. The economic aspects of the second of these measures were dealt with in a recent paper [1] by C. B. Townend, which is summarized below. Although referring in particular to conditions in England and Wales, the economic principles outlined are of general application.

In 1955/56, expenditure in England and Wales on sewerage and sewage disposal was £26 million, of which £10 million was required to pay loan charges on capital expenditure and £16 million to cover annual maintenance costs. This annual cost—two to three man-hours [2] per head—is extremely small in comparison with the benefits it brings.

Sewerage

Both for domestic sewage and for trade effluents the water-carriage system is the safest and cheapest, since it is continuously available and can be operated with greater facility than cesspools, pail closets or other primitive devices; these advantages more than offset higher loan charges. Of the total expenditure on sewerage and sewage disposal services in England and Wales, about one-half relates to sewerage. There is obviously considerable variation in the cost of sewers according to the topography of the district served, the nature of the ground and so on. Apart from these natural factors, the main considerations are: (*a*) the size of the town and density of its population; (*b*) the maximum volumes of flow to be allowed; and (*c*) whether rain water is dealt with in separate or combined sewers.

The greater the area of the town, the greater the lengths and sizes of the trunk sewers, with a corresponding increase in cost per head. On the other hand, larger sewers become more economical per unit volume of sewage treated.

One extremely important factor is the total volume of domestic sewage and trade waste to be dealt with. This is practically the same as that of water consumption and has been steadily rising for many years; in England it is often as much as 200 litres per head per day and in the United States of America 800 litres is not unusual.

The cost of sewerage varies also according to whether combined or separate sewers are used. In order to limit the cost of the former, they are usually provided with relief overflows which discharge into natural streams. In the case of separate sewers, it is not practicable to exclude completely all surface water and it is becoming desirable to accept also the more polluted washings from yards and other areas into the foul-water sewers.

[1] *Bull. Wld Hlth Org.*, 1959, **20**, 535

[2] The original paper gives money values in terms of sterling and of man-hours; in this article, the latter is used, wherever possible, as being of more general application. One man-hour is equivalent to 5 shillings, or 4 man-hours to £1.

Despite variations, current practice is tending towards a sewer capacity of 1 m^3 per head per day. The cost of separate sewers for foul-water and surface-water drainage is obviously higher than that of a combined system, but, if properly supervised, separate sewers have the advantage of preventing the pollution of rivers from overflows in wet weather and this, together with other advantages, has resulted in their increasing adoption in England.

" Uneconomics " of pollution

However diluted, liquids containing domestic waste and trade effluents are highly putrescible and may be dangerous to public health.

Where available, underground water represents a convenient and cheap source of supply. Pollution of such water may necessitate the provision of an alternative supply at a cost far greater than that of preventing the pollution at its source. Pollution of a river or lake can also reach the point where the water can no longer be used as a source of public supply and may be detrimental to agriculture, stock-breeding, fishing, and industry. Pollution of sea water may have harmful effects on fishing, bathing, and even shipping. Although the material losses involved cannot be accurately assessed, they are obviously far higher than the cost of a sewerage system. This of course does not imply that the self-purification capacity of a lake or river into which effluent is discharged should be completely disregarded, though it should not be overestimated.

Trends in sewage treatment

In the evolution of biological methods for the treatment of sewage, the initial process of land irrigation has been intensified by creating increasingly favourable conditions for bacteria to thrive, so that purification can now be carried out in a very small fraction of the space originally required. Work formerly needing 200 hectares now needs only 8 hectares of contact beds, 4 hectares of percolating filters, and 0.4 hectares of activated sludge plant. Sewage farms of considerable size, with large numbers of men to operate them, have been replaced by successively smaller works, which need less men but call for greater technical skill. The mechanization of modern plants entails a greater capital outlay but lower operating costs. This may be uneconomic in works serving smaller populations and it may be advisable to use simpler plants, though they may require proportionately more manual labour.

Scale of operation

The chief factor affecting the cost of sewage treatment for a given degree of purification is the size of the population served by the plant. Other very important factors, however, are the type of plant to be used, the amount of trade effluent to be dealt with, local ground conditions, etc. Thus only a very broad approximation of the costs per head for populations of different sizes can be given. The following table gives costs in England, based on 1958 price levels, for complete treatment at new plants; the loan charges are based on annual instalments of 6¼ % of the capital sum.

	Annual expenditure per head (man-hours)		
Population	*Operational cost*	*Loan charge*	*Total*
1 000	4.0	5.0	9.0
10 000	2.4	4.5	6.9
50 000	1.6	3.0	4.6
100 000	1.3	2.5	3.8
200 000	1.1	2.1	3.2
500 000	0.8	1.7	2.5
1 000 000	0.6	1.6	2.2
1 500 000	0.5	1.5	2.0

The variation from 9 to 2 man-hours between the smallest and the largest plants does not represent the whole of the economic gain from the latter, for, in practice, the former would be dealing only with domestic sewage whereas the larger plants would have to accept larger volumes of storm water and trade effluents of various kinds.

Regional organization

In the light of the foregoing data, the economic gain from the centralization of the various purification services in a single

regional plant can be easily appreciated. The number of communities that can be linked together in this way is limited only by the length of the trunk sewers required. For example, where individual units of 20 000 or 30 000 population can be linked together in one unit serving 500 000, a reduction in annual cost per head of 2 to 3 man-hours will be achieved. Each case must be considered on its merits, but the following benefits of centralization should always be borne in mind: greater economy; reduction in the number of sewage plants and operating staff; the possibility of employing specialist technical staff for the whole area at an economic cost; the greater dilution of trade effluents, which would overwhelm small works in many cases; and, lastly, the considerable balancing effect of a large sewerage system, which facilitates the prevention of pollution by overflows of sewage in times of wet weather.

Choice of processes

In this section we shall deal mainly with the economic aspect of some of the most common procedures in use.

Screening or comminution is the most elementary of all forms of treatment, and is carried out to remove unsightly solids, or, in cases where further treatment is to be given, to prevent chokage of the different machines. The cost of this preliminary treatment amounts only to about 3-5% of that of complete treatment.

The removal of settleable solids by sedimentation is relatively easy and cheap. By such means, it is possible to remove up to 70% or 80% of the suspended solids, which represents a reduction of the biochemical oxygen demand (BOD) load by 40-50%. The cost of this treatment is approximately 10% of that of complete sewage treatment and in modern plants one-third of the cost will be absorbed by operation, and the balance by capital charges. The factors to be borne in mind are the surface area of the tank and the detention period, which is usually between 1½ and 2 hours at maximum flow, but which, in dry weather, can and should always be increased up to 6 hours without, however, increasing the tank capacity. The cost of tanks varies according to their size, shape and de-sludging arrangements. The efficiency of sedimentation may be increased by chemical precipitation or mechanical flocculation, although from the economic point of view this is not to be recommended, particularly if it is to be followed by biological treatment, the most costly stage of purification.

The activated-sludge plant quickly became economically competitive with the traditional percolating filters, although in current practice each has its own place. The construction cost of filters is greater, whereas the operating costs of the activated-sludge plant are greater owing to its higher power consumption. In practice, the activated-sludge process is used more in large-scale operation, whereas the percolating filters are more often used in small plants because, among other reasons, they can be operated by less skilled labour. Including operating costs and loan charges, the total annual costs of biological treatment by filter or activated sludge amount to approximately one man-hour per head. For small plants, this figure will be greater, particularly in the case of activated sludge. In general, biological purification to advanced nitrification will account for about 40% of the whole cost of complete treatment. In the case of both filters and activated sludge, various processes have been developed in order to reduce operating costs, although, generally speaking, any success achieved has been at the expense of the quality of purification.

Although both the biological purification processes mentioned are becoming almost universally used, land treatment still has its uses in the increasingly rare places where large areas of land are available. When feasible, this is less costly than other processes.

Storm-water sedimentation

Where large increases of flow are received in wet weather, river pollution may be prevented to a large extent by sedimentation of excess flow. The cost will not usually

exceed 5% of the over-all cost of complete sewage treatment.

Sludge disposal

After treatment, the quality of the used water can be restored substantially to its original state. This however is only the first stage of the process, since up to 1% of the sewage flow may remain as sludge, highly putrescible and retentive of water. This may contain 60-65% of the original impurity load of unsatisfied oxygen demand. The various methods used for the treatment of sludge enable this operation to be undertaken at a cost not exceeding about 20% of the total cost of sewage disposal. Among the various sludge treatment processes, the principal one is the digestion process which is entirely inoffensive, stabilizes putrescible matter, destroys grease, reduces the quantity of solids by one-third or more and allows the separation of large volumes of water. In addition, a valuable by-product, methane gas, is evolved during the process. At present prices, the cost in England of a complete plant with tanks for the first and second stages of digestion is, including operating expenses and loan instalments, equivalent to 0.16-0.24 man-hours per head. In the disposal of sludge, first consideration should be given to its utilization either in the form of fertilizer —if not contaminated by deleterious trade wastes and provided that all harmful grease has been eliminated—or as a source of industrial by-products. The simplest and cheapest method of distributing sludge to agricultural land is to pump it in liquid form. This can be done without undue trouble over a distance of up to 20 km; for longer distances, previous drying would be essential.

Alternative installations

As indicated above, the present over-all cost of complete treatment of sewage in England ranges, for different plants, from the annual equivalent of 9 to 2 man-hours per head per year according to the size of the community to be served. This total may be apportioned approximately as follows:

	Percentage of total cost
Screening and grit removal	5
Primary sedimentation	10
Biological treatment, including final sedimentation	40
Storm-water sedimentation	5
Sludge disposal	20
Miscellaneous (including roads, landscaping, housing of staff, laboratory control, administration and management, etc.)	20

These percentages refer to a complete modern plant, although savings may be made on certain processes. However, the total costs for minimum treatment by sedimentation only might be as low as one-third or one-quarter of the over-all figures given. In any event the higher the cost the fuller the treatment. In many places advantage can be taken of the conditions of the ground and, if there is any shortage of capital for a modern plant, cheaper alternative installations may be used although these call for more labour. Thus certain types of tanks may be replaced by improvised devices which, though less satisfactory, are very much cheaper; percolating filters may be constructed of rubble or other waste materials and some sewers may be replaced by open earth channels with the minimum of lining, etc.

Sewage utilization

Under some conditions, the utilization of sewage may reduce the cost of purification. Where water is scarce, sewage effluent may be used in industry, agriculture and indirectly even for water supply by means of sub-soil filtration or otherwise. Sludge may be used as a fertilizer in places where it can be pumped directly, but if it has to be dried in order to transport it for greater distances the operation is uneconomic. In many countries the utilization of methane gas from the digestion of sludge has proved of considerable economic value. At present, the normal production for large works in England may represent as much as 15% of the total costs of sewage disposal. In modern plants, the methane gas which evolves during biological treatment is used in the activated-sludge process which requires a large supply of power; that the

sewage arriving at the sewage plant brings with it sufficient fuel for its own purification and disposal is obviously an advantage.

Trade effluents

It is fortunate that the natural processes which have been harnessed for dealing with domestic sewage can also be adapted for the satisfactory and cheap treatment of most industrial effluents. It must be borne in mind, however, that in a minority of cases the effluents, owing to their unsuitable composition, may impair the biological processes which form an important part of ordinary purification. In such cases, a careful watch must be kept on the composition of the effluent and its concentration, and some kind of pre-treatment may be necessary. In exceptional cases the problem may be sufficiently serious to affect the choice of location of the industry itself. It is advisable that industry should contribute to the operating costs of the purification works in proportion to the volume of waste and the extent to which the different stages of purification are affected. In this way, not only is the community relieved of expenditure for which it is not responsible, but the industry concerned will also attempt to reduce costs by using plant which reduces the volume or improves the quality of its waste. In England, trade effluents account for 20-25% of the present national expenditure for sewage purification, a proportion which will undoubtedly increase rapidly. Furthermore, new industries —plastics, artificial silk, DDT and antibiotics, to mention but a few—have been developed, all producing effluents that make treatment difficult. Another problem that calls for particularly careful attention is the disposal of radioactive waste.

Financing of capital expenditure

In a few cases a community may finance its purification plant out of current revenue, but it is more normal for it to seek a loan to be repaid within a reasonable period. The loan period should be long enough to relieve the community of an excessive burden, taking care, however, to avoid the possibility of having to replace or extend works before they have been completely paid for. Further, the debt should not be passed on to posterity unless the works have been constructed on a long-term plan based on an expected rise in the number of users. In England the usual period of repayment of loans for normal structures is 30 years, with shorter periods of 10 or 15 years for machinery or other items with a lower expected life. The interest rate depends on capital market availabilities at the time of construction and the amount of annual repayment depends, of course, on the loan period and the rate of interest. In periods of shortage of capital and high rates of interest it may be advisable to construct cheaper plant, even at the expense of increased operating costs. The same trend may be expected in countries where labour costs are low.

* * *

The standard of living enjoyed in any country depends on the health and activity of its inhabitants. In Great Britain in recent times the average life span has been increased by twenty years, and there is no doubt of the overwhelming contribution made by improvements in sanitary conditions. It may be claimed, therefore, that the capital invested in this type of plant has paid handsome dividends. While recognition of the important place in sanitation occupied by the disposal of sewage and trade effluents is only of recent date, it is obvious that the penalty of neglecting such an important aspect of sanitation, which incidentally can be undertaken at so small a cost, may in the long run be a heavy burden on society, as a result of the pollution of its natural water supplies.

TRACHOMA CONTROL IN EUROPE

Trachoma, described as "the disease of poverty and overcrowding", is one of the oldest known and most widespread of diseases, and is still the principal cause of preventable blindness in the world. Because of its distribution, which takes no account of national boundaries, it is a disease which calls for international action, and WHO is playing an active part in its control.

Since 1952, WHO, with the support of UNICEF, has assisted eleven countries in initiating or developing trachoma control projects. The methods employed have been: prophylaxis, by the identification and collective treatment of the age, sex and occupational groups which form the major sources of infection; and the routine treatment of cases, as a purely curative measure aimed also at preventing disabling complications and sequelae.

By the end of 1958 more than 6 000 000 persons had been examined in these projects, and more than 4 000 000 cases of trachoma and associated diseases of the eye had been treated.

Despite very considerable advances in field techniques and methods of treatment, there are still some serious deficiencies in the scientific knowledge of the disease and in the armamentarium. The development of more effective prophylaxis has been hampered by the paucity of basic etiological and epidemiological data, by the fact that treatment, although effective, needs to be continued over long periods, and by the lack of any means of immunization. Very little has been done as yet in the investigation and control of environmental factors favouring transmission of infection. The recent successful isolation of the virus of trachoma, however, and its culture in series and in quantity, has greatly increased the scope of research in all fields of trachomatology, and important advances are expected in the near future.

In October 1958, a European Conference on Trachoma [1] was held in Dubrovnik under the auspices of the WHO Regional Office for Europe, and at the invitation of the Government of Yugoslavia. This Conference marked a new and broader approach to the control of trachoma. Participants were invited from a group of countries (Portugal, Spain, Italy, Yugoslavia, Greece and Turkey) in which the environmental conditions, the problems of health and disease, and the national resources are roughly comparable. They included experts in epidemiology, ophthalmology, health education, statistics and public health administration, and the discussions covered all these fields.

The prevalence of trachoma is steadily decreasing in many parts of southern Europe, chiefly as a result of improved living conditions, but it remains a serious problem in certain areas. The disease is contracted in early childhood and, in general, the higher the endemicity, the earlier the onset. Trachoma is of relatively low contagiousness, but it tends to spread in families probably as a result of such habits as the sharing of beds, washing-water, and towels with sufferers from the disease. Not enough is known, however, of the role of these habits in spreading trachoma, and extensive epidemiological investigations are required.

It was considered that the most rewarding studies would be longitudinal studies of relatively small communities living under well-defined conditions, stress being laid on the community and family pattern of trachoma; but where only groups could be studied they should be large enough to be representative, and there should be adequate controls. Whenever possible, epidemiolo-

[1] The report of the Conference forms the basis of this article.

gical studies should be supplemented by controlled field trials. As in so many other fields of health where the data vary from country to country, there is no international uniformity in such matters as definitions, diagnostic methods, classifications or criteria for selecting population groups. Efforts have been made by WHO to standardize methods and procedures, so that the information produced by any one country is immediately understandable and usable internationally. These efforts should be continued and supported.

The Geneva Classification of Trachoma [2] has proved suitable for diagnosis, and the individual record card designed by WHO is very suitable for recording data in a clear and uniform way, enabling them to be read easily and processed quickly. It should be used as a basis for national records, and routinely in hospitals and dispensaries. The adoption of standard epidemiological tables showing the stage and gravity of the disease in a community by sex- and age-groups, before and after treatment, would be valuable. The frequency of trichiasis in different age-groups could be used as a single and simple index of severity. In general, fewer and simpler tables are required in the statistical evaluation of the results of routine mass campaigns than in field trials and other research projects, but the principles of evaluation in each case should be the same. Evaluation of mass treatment should show not only the percentage of cures and improvements, but also the subsequent reduction in the incidence of new infections in the community.

Suitable subjects for future studies in the epidemiology of trachoma are:

(1) onset of trachoma (clinical mode of onset);

(2) age of onset;

(3) mode of transmission;

(4) prevalence of trachoma in relation to race, sex, ethnic group, nationality, religion, profession, unhygienic habits (sharing beds and towels, water supplies, etc.), geographical and climatic conditions, socio-economic conditions, education and attitude of the people, previous and concomitant diseases, etc.;

(5) evolution of the disease in relation to age;

(6) severity;

(7) complications and sequelae.

The Conference discussed the diagnosis of trachoma, which is sometimes difficult in early cases, especially under field conditions, and recommended standard methods for clinical examination. To achieve uniformity in diagnosis, ophthalmologists should be encouraged from time to time to work together and compare opinions. Seminars and refresher courses with practical work should be organized both nationally and jointly between countries. And the diagnoses of field workers should be periodically checked by consultants, preferably in the presence of the workers so that they may learn from expert opinion.

In the opinion of the Conference, the best treatment of trachoma, under hospital conditions, is by certain of the wide and medium spectrum antibiotics, used in combination with sulfonamides. The former act best when applied locally, the latter when given systemically. Under field conditions, where the use of sulfonamides presents some risk, antibiotics alone have given satisfactory results. The value of the very economical " intermittent " method of treatment (i.e., the application twice daily of 1% chlortetracycline or oxytetracycline on three consecutive days during each of six months), developed by the WHO team in Morocco, was confirmed by participants from several other countries.[3] Promising results were also reported from initial trials in Italy with repository penicillin and repository sulfonamides (sulfamethoxypyridazine) which, because they need only infrequent administration, raise hopes of the development of even more economical methods of mass treatment.

It was recognized that, with modern drugs, resolutions of the lesions caused by trachoma

[2] *Wld Hlth Org. techn. Rep. Ser.*, 1952, **59**

[3] This course of treatment, however, appears to be nearly the minimum effective one. In many projects nowadays treatment is given for five or six days each month to allow for absenteeism.

and clinical healing may not occur until weeks or months after the elimination or inactivation of the infective agent. A long follow-up period is therefore necessary in mass treatment operations, to determine the rates of cure, relapse, resistance, and re-infection.

Dispensaries are necessary in areas where trachoma is endemic, as centres for trained field workers who, under the supervision of an ophthalmologist, can carry out the work of family treatment, case-finding, tracing of contacts and health education. Relatively few ophthalmologists have sufficient training and experience in preventive medicine, epidemiology, statistics, health education and public health administration for the kind of work they will be expected to do, and instruction in these subjects should be part of all formal training courses where trachomatology is taught. In countries where trachoma is endemic they should also be included as subjects in the normal medical curriculum. The Conference recommended that WHO should study further the question of education and training of personnel engaged on trachoma control.

The need for health education of the public requires no stress. Some of the shortcomings of programmes for trachoma control appear to be due, not to the preventive measures taken, but to a failure in public relations: the public was ill-informed, the doctors and nurses knew too little about health education methods to convince the public of the importance of what they were doing. Medical and nursing personnel should have theoretical and practical instruction in modern health education, preferably as part of their basic professional training, or at least in refresher and in-service courses. Schoolteachers should also be trained, so that from childhood on people have a solid grounding in human biology and the elementary principles of health.

The Conference recognized the importance, in the control of trachoma, of environmental sanitation, including, in particular, the provision of adequate water supplies where these are deficient.

BASIC PLANNING IN HEALTH EDUCATION

This topic was the subject of a seminar held by the WHO Regional Office for the Eastern Mediterranean in co-operation with the Government of Iran, from 28 October to 9 November 1958, at Teheran. The article that follows is based on the final report of the seminar, which was recently published.[1]

In the less developed countries, the general trend in health education is to replace "direct" instruction given by personnel of the national health services or international agencies by "indirect" instruction in the form of action undertaken by the people themselves with the help of public health personnel and other community workers. There are several reasons for this trend: lack of public funds, disappointment with the slow rate of progress in areas where direct instruction has been carried out over a period of years, increased knowledge of the way in which people learn and are stimulated to accept changes in their ideas and habits, and increased understanding of how closely health practices are interwoven with the whole fabric of beliefs, customs and values. These customs and values cannot rapidly be changed, and the aim of the indirect approach is primarily to help people to alter their own environment so that it will be easier for them

[1] A limited number of copies of this report are available from the WHO Regional Office for the Eastern Mediterranean, Alexandria, Province of Egypt, United Arab Republic, on request, to persons officially or professionally concerned with health education activities.

to keep well. It has proved particularly successful in communities not previously accustomed to individual responsibility, e.g., in traditionally feudal or tribal societies and where poverty, malnutrition, endemic diseases and ignorance have combined to produce apathy and inertia.

On the other hand, direct health education by the extensive dissemination of information, reinforced by the use of audio-visual aids, is of value in countries with well-established health services where people are already confident of their ability to do things for themselves. Whatever method is used, it is essential that there should be a direct approach to the people themselves and a full preliminary explanation of any measure proposed for the improvement of their health.

Health education should not be left solely to those with specialized training in this branch of public health, but should be the concern of everybody engaged in any form of community welfare work. It has been found, however, that some medical and public health personnel are not easily persuaded of the importance of the health education aspect of their work. This situation is likely to continue as long as health education is not accorded the same status as other public health activities. The failure to recognize the need for specific health education measures as a definite part of the planning and execution of any public health project is unfortunate because it may lead to resistance to the acceptance of the project by the people whom it is designed to help.

Co-ordination and organization

In many countries health education activities are in the hands of a number of organizations and individuals, operating in an entirely uncoordinated fashion. The proper co-ordination of health education activities within a country depends primarily upon the existence of a more general co-ordination of the work of governmental, voluntary and international organizations concerned with health and social welfare. Much has been done to co-ordinate national and international efforts in this field by the International Union for Health Education, a non-governmental organization, one of whose main tasks is to promote the creation of national committees and societies for health education.

On the national, regional and local levels, health education committees should be established under the aegis of the national Ministry of Health and should include representatives from all other agencies concerned with health and social education. The staff selected should be responsible individuals with security of employment and a recognized professional status, and funds for health education should be allocated on the same basis as for the other public health services.

Training of personnel

Some familiarity with the principles of health education is essential for all medical personnel and desirable in the case of a few key persons in non-medical administrative positions. Theoretical and practical courses in health education should be included in the curricula of all medical, public health, nursing and midwifery schools, and training departments should be established in national Ministries of Health, with the following functions: (*a*) analysis of the country's health education needs; (*b*) recruitment and selection of trainees; (*c*) arrangements for scholarships and fellowships; (*d*) study of the present curricula of the various training schools with reference to their health education content and training methods. The organizers of special courses for teachers, social workers, religious leaders, agricultural workers, etc. should be encouraged to include health education among the subjects studied. Health education should also be included as a specific topic in seminars or courses on such subjects as mental health, public health, nursing, malaria eradication, bilharziasis, nutrition, maternal and child health, tuberculosis, etc.

Health education in schools

The main purpose of health education in schools is to enable children to learn enough about health and disease to be able to protect their own health and that of their families

and the communities in which they live. For this, it is essential not only that the child should learn about himself and his environment, but that health education in schools should be a practical activity rather than a memorized lesson. Unless that is understood by teachers, parents, school medical staff and the educational authorities, no great progress can be expected.

Health education in schools might be improved by obtaining the co-operation of parent-teacher associations; by the school's initiating or taking part in village sanitation or similar campaigns; by preserving the continuity of child health supervision between the health centre and the school so that the public health doctor and nurse who supervise the child's health during his infancy and pre-school years will continue to do so during his school years.

During their training, all teachers should receive simple and practical instruction on the basic facts regarding the promotion and protection of their own health and that of the children in their care, and on the cause and prevention of local health problems. A course for this purpose might cover: anatomy and physiology; basic facts of health and hygiene (nutrition, communicable disease, sanitation, etc.); health needs of children in primary and secondary schools; common local deviations from health in school-children; community health services and resources; principles, methods and media of health education. Teaching should be of practical application (e.g., foods should be known by their health-giving properties rather than by their scientific classifications) and combined with practical experience (visits to local health services, interviews with health personnel in their places of work, surveys of local foodstuffs or health needs, practice in making and using simple visual aids, etc.). The co-operation of the health authorities should be sought for the continuation and expansion of health education activities in schools.

Community programmes

Improved general education—including, in the less developed countries, fundamental or adult education for the older citizens—usually leads in the long run to improved health. Fundamental education programmes have frequently been the precursors of community development programmes in which the people themselves combine their efforts with those of the government authorities to improve their economic, social and cultural conditions. Health activities naturally play a large part in these programmes and their educational value is immense.

Application to specific activities

Maternal and child health

In the developing countries, the breast-fed child will be relatively safe from the two major hazards to child health—malnutrition and gastro-enteritis—if the mother has learned to feed herself so that she can feed her child adequately. Intensive health education is needed in the pre-natal period if good lactation is to be ensured. Health education has a part to play also in the improvement of the environmental conditions—malnutrition, inadequate housing, and lack of hygiene—which contribute largely to the high mortality rate observed in children between 1 and 4 years of age in the less developed countries.

Health education should be given not only to the mother, but to the whole family. As well as employing such media as the press, the radio and women's papers to the full, maternal and child health personnel should use every possible opportunity for individual or group education. For example, " mother-craft " classes for adolescent village girls have proved extremely successful, and " graduates " of such classes have later played a useful part in health education activities in their own villages.

Instruction in health education methods and techniques should be introduced into the training of all maternal and child health personnel.

Malaria eradication

Education of the public is needed at every stage of a malaria eradication campaign to ensure that the measures taken are understood, accepted and properly carried out.

During the spraying phase the people must understand the need for total coverage of all dwellings, and the need to refrain from whitewashing and replastering, which might destroy the insecticide.

During treatment, they must be willing to allow blood smears to be taken, and to follow the course of treatment regularly. This is particularly difficult, since, whatever form of treatment is used, it will involve constant supervision of the person under treatment, and the reluctance of most villagers to spend periods of time in hospital or away from home is well known.

During the surveillance phase, constant health education will be needed to maintain interest in and a sense of responsibility for the success of the campaign. Especially when measures against the mosquito cease, people are apt to lose interest and become negligent.

Health education should therefore be an integral part of all malaria eradication campaigns. The educational programme should start before the attack phase and should be evaluated and adjusted periodically as the campaign develops.

In countries where rural health services are well organized, the health education side of the campaign should be undertaken by the personnel of those services during the consolidation and maintenance phases. In others, towards the end of the consolidation phase and during the maintenance phase, the malaria eradication organization should be used as a nucleus for the development of the rural health services, and the already partly trained workers should be given further training to enable them to be absorbed into these services.

Environmental sanitation and bilharziasis

Health education is particularly important in schemes for improved environmental sanitation, since these often involve changes in deep-rooted habits and customs. If there is a well-organized health education department with adequate field staff in the country, they should have ample time to prepare the community for the acceptance of sanitary improvements before any work is begun. On the other hand, the sanitarian may be the first health worker in a particular area, and the preliminary education must be carried out by him.

In the case of bilharziasis, the existence of sanitary latrines, clean drinking-water and dispensaries for the treatment of infected individuals is a prerequisite to effective education on the cause and prevention of the disease. The examination of newcomers to controlled areas and the siting of villages away from infected water are more likely to be accepted and accomplished once the people have experienced the value of initial sanitary improvements.

* * *

The remaining hazards to public health are increasingly those which involve for their control not only the application of certain recognized techniques, but changes in the economic and educational level of the people. Their final eradication demands not only knowledge of the cause and means of prevention among professional health workers, but also the understanding and voluntary co-operation of the people themselves; this can best be achieved through intensive health education.

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958*

5. International collection and publication of data

The Fourth World Health Assembly decided that one of the main aims of the Organization should be gradually to build up a body of sound statistical information and advice, covering all parts of the world, by which the policy of the Organization could be guided and its operations and their results measured. Another aim was to encourage the various branches and regions of the Organization to make the fullest use of the statistical data and facilities available at WHO Headquarters.[1]

This was a formal confirmation of the function of collection, analysis and publication of statistical and epidemiological data which, as already noted, has been one of those undertaken by international health agencies since their inception. By Articles 63 and 64 of WHO's Constitution each Member State must communicate promptly to the Organization important laws, regulations, official reports, and statistics pertaining to health which have been published in the State concerned, and provide statistical and epidemiological reports in a manner to be determined by the World Health Assembly. Something has already been said about the action taken by WHO both to continue and extend systems of collecting and publishing medical and health statistical data and to undertake or report epidemiological studies. Certain further features of this basic work require noting, as in one sense there is no more important work, initially, in the field of epidemiology and statistics than that of persuading, encouraging, and assisting countries to make their own arrangements for recording morbidity and mortality, and for ensuring the widest use of the statistics for public health and research purposes.

General epidemiological and statistical data

WHO inherited the statutory rights and obligations of the OIHP and of the Health Division of the United Nations Relief and Rehabilitation Administration (UNRRA) (which had assumed responsibility for OIHP's duties in January 1945) in respect of international quarantine;[2] and the machinery of the Health Organisation of the League of Nations for the collection of general epidemiological and statistical information. Under the International Sanitary Regulations (WHO Regulations No. 2) the health administrations of a large number of countries throughout the world have the responsibility of reporting the appearance of quarantinable diseases—cholera, plague, epidemic (louse-borne) typhus, relapsing fever, smallpox and yellow fever—to WHO. In its turn, WHO has the responsibility of sending this information to all health administrations and this it does by a daily broadcast over an international radio network and by publication in the *Weekly Epidemiological Record*, which is a legacy from the League of Nations and has been in existence for more than thirty years. The Record also contains notes, based on current statistical data, on incidence of certain non-quarantinable diseases, such as influenza and poliomyelitis, whenever their spread becomes of international importance.

A vast amount of statistical material is received by WHO in weekly, 10-day, fortnightly, monthly, quarterly and annual reports, which are furnished by the health and statistical departments of most countries in the world and by many local statistical offices. They include national and local statistical reports and tables from over 250 countries and territories. These reports

* The earlier parts of this account of WHO's work in international health statistics appeared in: WHO Chronicle, 1959, 13, 67, 214, 253, 378.

[1] *Off. Rec. Wld Hlth Org.*, 1952, 35, 18

[2] WHO Chronicle, 1956, 10, 273

form a heterogeneous mass, varying, despite WHO's efforts at standardization, in form, accuracy, completeness, definition and classification, and in the type of data supplied. While many countries and territories do not provide health statistics, mainly because of lack of physicians and of registration officials and machinery, in general it may be stated that such vital and health statistics as are available to governments of Member States are sent to WHO. Also under Article 61 of WHO's Constitution each Member State is required to " report annually to the Organization on the action taken and progress achieved in improving the health of its people ", and these annual reports contain a proportion of statistical information.

The statistical data collected are classified and extracted at WHO headquarters in Geneva, and form the basis of the *Epidemiological and Vital Statistics Report*, a compilation which has been published by WHO monthly since June 1947 and which contains statistics on disease, general mortality, infant mortality, and birth rates in certain countries, and statistical tables on epidemiological and demographic topics. It has, for example, included tables showing specific death rates for selected countries in cancer (of various types), certain communicable diseases, alcoholism, arteriosclerosis, accidents, etc. It is a lineal descendant of the *Monthly Epidemiological Report* issued by the League of Nations from 1922 on. A year-book is published, *Annual Epidemiological and Vital Statistics*, with a time lag of about two years as detailed figures are not as a rule supplied immediately by local administrations. This annual volume contains tables of population, general vital statistics and causes of death according to age and sex, and cases of, and deaths from, notifiable diseases. In addition, it provides tables of death rates from selected causes by age and by sex; the seasonal distribution of notifiable diseases; and numbers of health personnel, hospitals, establishments and vaccinations in many countries. The tables on vital statistics owe much to the United Nations and its Statistical Office in New York.

Responsibility of UN and WHO

It is pertinent here to outline the relative responsibilities for the collection of statistical data of the United Nations and WHO. In order to avoid duplication of effort and overlapping in the collection of information, the various fields of vital and health statistics are covered as follows:

(*a*) *Population data—aggregates, and by age and sex :*
collected by the UN;
published by both agencies, WHO reproducing the UN figures exclusively.

(*b*) *Births—numbers and rates :*
data collected by the UN;
published by both agencies, WHO reproducing the UN figures exclusively.

(*c*) *Stillbirths—numbers and rates :*
data collected by the UN;
published by both agencies, WHO reproducing the UN figures exclusively.

(*d*) *Fertility data :*
collected and published by the UN;
material supplied by the UN to WHO as and when required for particular purposes or publications.

(*e*) *Marriages :*
data collected and published by the UN.

(*f*) *Life table functions :*
data collected and published by the UN;
material supplied by the UN to WHO as and when required for particular purposes or publications.

(*g*) *Deaths by age and sex :*
data collected by the UN and published by both agencies;
data on infant deaths collected by the UN with the sub-classifications requested by WHO.

(*h*) *Deaths by cause, subdivided by age and sex :*
data according to the Abridged International List collected by the UN, and supplied by the UN to WHO; [3]

[3] In view of the special interest and competence of WHO in the International Classification of Diseases, Injuries, and Causes of Death, and the methods of implementing this Classification, WHO, when necessary, corresponds with national authorities with a view to the adaptation of their statistical material to the Classification, particularly if the classification in use in their countries does not conform with the Abridged International List used in the UN questionnaires. Copies of such requests are sent systematically to the Statistical Office of the UN.

additional data according to the Detailed International List collected by WHO, when desired, the UN being informed of each such collection;

publication by the UN of aggregates by each cause of the Abridged List;

publication by WHO of such aggregates and of details by age and sex for each cause of the Abridged List and for such additional detailed causes as may be deemed desirable.

(*i*) *Communicable diseases :*
data collected and published by WHO.

(*j*) *Morbidity :*
data collected and published by WHO.

(*k*) *Medical institutions and public health measures :*
data collected and published by WHO, and communicated to the UN in the form of final tables for publication purposes, together with technical notes on qualifications attaching to the data.

(*l*) *Medical and sanitary personnel and institutions :*
data collected and published by WHO and communicated to the UN in the form of final tables for publication purposes, together with technical notes on qualifications attaching to the data.

(*m*) *Population, vital and health statistics of cities :*
in the case of cities adjacent to ports and airports, and also of aggregates of cities, WHO collects data on population, births, deaths and diseases, as required for such cities to meet their special epidemiological requirements; the UN collects and publishes population and vital statistics on cities as part of its programme coverage of communities according to size.

Special health data

Continuing a practice begun by the League of Nations, WHO has maintained records of the numbers of physicians, dentists, midwives, nurses, pharmacists, and veterinarians as notified by countries. These records now cover a period of 25 years, and since 1950 details have been published for about 180 countries and territories. The data are difficult to report in a uniform way because of the differences in professional qualifications, and because reports vary in completeness and accuracy.

Data on national hospital establishments are also recorded, with the numbers of hospitals and hospital beds by categories, i.e., general, maternity, sanatoria, leprosaria, etc.

In 1953 the public health reports (annual and occasional) and special related official reports containing health statistical information were classified in the United Nations Library, Geneva, the International Labour Office, and WHO Headquarters Library, and a list prepared and published as a supplement to the *WHO Library News*.[4] It gives a selection of those official reports of countries which deal specifically with public health or medical subjects and are issued annually as separate publications. In some countries, e.g., Canada and the United States of America, where important health functions are decentralized, available provincial or state reports are included; but reports from smaller administrative units, such as local authorities and cities, are not. The classification revealed that annual reports were not complete and were being prepared irregularly. An effort is therefore being made, especially by the statistical advisers of the regional offices, to assist countries in improving them, since they are of immediate value administratively to the national health services, as well as being helpful to workers both at the local and the international level.

Through such official and other collections the WHO library and reference system is coming to play a more direct role in the collation of published statistical and epidemiological material. It is helping, in combination with the other statistical services, both headquarters and regional, to make WHO a major, if not the chief, repository of essential world and regional data, statistical and epidemiological.

[4] *WHO Library News*, 1955, **8**, Supp. 2

Other publications

Apart from its periodical statistical publications, WHO publishes the *Bulletin of the World Health Organization*, its principal scientific organ, which prints articles of international significance falling within the scope of WHO's interest and activities. Statistical and epidemiological articles appear in it periodically. One whole issue of the Bulletin in 1954 [5] was devoted to health statistics, and one in 1956 [6] to epidemiology, each covering a wide range of subjects. In the case of the statistical number these included the use of sampling for vital registration and statistics, the securing of appreciation of health statistics, needs in vital and health statistics in the less developed countries, and future objectives of national committees on vital and health statistics. The epidemiological number included such subjects as; cancer of the breast, poliomyelitis, accident mortality amongst children, protein malnutrition, and endemic goitre. Recent numbers of the Bulletin on such subjects as bilharziasis,[7] endemic goitre,[8] virus diseases,[9] the treponematoses,[10] and malaria,[11] also dealt with various epidemiological and statistical aspects of these subjects.

In its earlier years the WHO *Epidemiological and Vital Statistics Report* contained statistical studies on such subjects as the evolution of mortality in Europe during the twentieth century, recent birth-rate trends, the present state of population growth, and the influence of the decline in mortality on growth of population.[12]

The reports of the Expert Committee on Health Statistics are of great value in the study of international statistics. They appear in the WHO *Technical Report Series*,[13] and cover a wide range of international statistics.

All these publications reflect the increasing application of statistical and epidemiological methods to WHO programmes. But while the quality of the statistics published by WHO continues to be dependent upon the reliability, completeness, and comprehensiveness of the information collected at the source, which fall far short of what they might be, it cannot be said that there is any ground for complacency about them.

[5] *Bull. Wld Hlth Org.*, 1954, **11**, 1
[6] *Bull. Wld Hlth Org.*, 1956, **15**, 1
[7] *Bull. Wld Hlth Org.*, 1958, **18**, 658
[8] *Bull. Wld Hlth Org.*, 1958, **18**, 1
[9] *Bull. Wld Hlth Org.*, 1957, **17**, 865
[10] *Bull. Wld Hlth Org.*, 1956, **15**, 863
[11] *Bull. Wld Hlth Org.*, 1956, **15**, 361
[12] *Epid. vital Statist. Rep.*, 1949, **2**, 64, 192; 1950, **3**, 30; 1951, **4**, 36; 1947, **1**, 38; 1948, **1**, 332; 1952, **5**, 191
[13] *Wld Hlth Org. techn. Rep. Ser.*, 1950, **5**; 1950, **25**; 1952, **53**; 1957, **133**; 1959, **164**

Reports of Expert Groups

Hygiene and sanitation in aviation *

Two and a half million in 1937, 90 million in 1957—these figures reveal the enormous increase during 20 years in the number of passengers carried by airlines. In itself, this increase gives an idea of the difficulties now encountered by the health services responsible for watching over the sanitation and hygiene of air transport. Nowadays air passengers are no longer surprised to be able to sleep, eat and find almost all the conveniences they have at home on board aircraft, but they certainly have little idea of the difficulties which have to be overcome in order to supply, for example, water which is perfectly fit to drink, and cold or hot foods which are not harmful to health. Although they are not the only health problems relating to aircraft or airports, water supply and food and milk hygiene are perhaps the most important for the users of airlines.

If very strict rules are not observed, there is a risk that the water made available to aircrews and passengers may contain chemicals or micro-organisms in harmful quantities. The water used on board aircraft usually comes from the airport supply, which must, in the first place, be suitable for consumption and comply, if possible, with the WHO international standards. The water is generally transported from the airport supply system to the aircraft by water carrier, another possible source of contamination, as are the hoses which must also be employed. The water is subsequently transferred to a fixed or mobile tank, itself provided with piping. Every operation should therefore take place in accordance with very strict rules of hygiene and every tank used should be carefully disinfected. When an aircraft is provided with an integral water system it is desirable—this is one of the recommendations of the WHO Expert Committee on Hygiene and Sanitation in Aviation [1]—for a given content of free chlorine to be maintained in the distribution system. The " Guide to hygiene and sanitation in aviation " which is annexed to the Committee's report gives all necessary technical details regarding the rules to be observed in relation to water used on board aircraft or in airports.

Food presents another practical problem whose existence is not often realized. On a long distance flight, scores of hot meals are served. Within a few minutes each passenger has before him a full meal which clearly has not been prepared on the aircraft itself. How is it possible to prepare this food in kitchens on the ground and then serve it more than two hours afterwards, in the middle of the flight, without any risk for the passenger who eats it ? It is known that food kept at room temperature for more than two hours may give rise to infection or food poisoning because of the multiplication of bacteria or the development of toxins by specific types of bacteria which may be present in the foodstuffs used. The aircraft industry has shown much ingenuity in developing methods for storing foods at any required temperature over long periods. The " Guide to hygiene and sanitation in aircraft " states that perishable foods to be served more than two hours after preparation should be kept at a temperature of either 10°C or below, or 60°C or above. The galleys with which modern aircraft are equipped make it possible to maintain these temperatures. Naturally, personnel handling foodstuffs must be subjected to strict medical examination, and the actual handling technique should be laid down very rigorously.

* WHO Expert Committee on Hygiene and Sanitation in Aviation (1959) *First report* (*Wld Hlth Org. techn. Rep. Ser.*, No. 174), 62 pages. Price: 3/6, $0.60 or Sw. fr. 2.—. Also published in French and Spanish.

[1] Members of the Committee: Mr S. Haegerström, Sweden; Dr A. El Halawani, United Arab Republic; Mr M. C. Hope, USA (Rapporteur); Mr R. Maurel, France; Dr E. Tostes, Brazil; Sir Harold E. Whittingham, United Kingdom (Chairman). Representatives of the International Civil Aviation Organization: Mr. F. X. Byrne; Dr F. E. de Tavel. Secretariat: Dr H. G. Baity, WHO; Mr R. N. Clark, WHO; Dr R. I. Hood, WHO; Mr J. N. Lanoix, WHO (Secretary).

The sanitation of international airports depends on many factors: water supply, disposal of sewage and waste from aircraft, control of vector insects or rats. The Committee was of the opinion that the dissemination of its " Guide to hygiene and sanitation in aircraft " would do much to encourage a full-scale programme for improved sanitation in international airports. The aim of this guide is to provide general instructions on necessary sanitary measures at airports and on aircraft, and to indicate sources from which more detailed information on the subject can be obtained.

Social psychiatry and community attitudes *

" Social psychiatry refers to the preventive and curative measures which are directed towards the fitting of the [mentally ill] individual for a satisfactory and useful life in terms of his own social environment . . . " This definition is given in the seventh report of the WHO Expert Committee on Mental Health.[1]

It is evident that action of this kind can be successful on one condition only: that the psychiatrist has a full knowledge of the social environment in which the patient lives and of the customary attitudes of the community to the mental patient and to those who treat him. This knowledge is, in fact, indispensable if the community is to be taught to co-operate in the prevention and treatment of mental illness and in the rehabilitation of those who suffer from it. Collective reactions to mental patients vary considerably according to the community concerned. In relatively unchanging agricultural communities persons suffering from mild mental disorders often continue to live with their families —which may be in itself a good thing, but which also makes it impossible to reach and treat the patient. In more rapidly developing societies, on the other hand, the problem is entirely different. In the most highly developed countries the general tendency formerly was to exclude mental patients from society—which led to the creation of large psychiatric hospitals remote from the cities in which mental patients were " interned " and cared for by physicians who were called " alienists ". Social psychiatry confined itself then to attempts to reintegrate the mental patient into social life, but the total absence of social contacts between the community on the one hand and the patient, hospital, even the psychiatrist, on the other, made this task extremely difficult. At the present time, the psychiatrist can often bring his patient to the threshold of normal life—but all his efforts are vain if the community, in spite of the creation of psychiatric hospitals to which people can go voluntarily, of day hospitals, night hostels and therapeutic clubs, maintains a hostile or mistrustful attitude to mental patients and those who care for them.

How are we to obtain sufficiently accurate knowledge of community attitudes to mental patients ? An outstanding survey was begun in 1950 in the United States by the National Opinion Research Center of Chicago University. The aim was, by interviews with more than 3500 persons, to describe in detail the characteristic attitudes of the American community to mental diseases and explain the reasons why they assumed the form they did. The British Broadcasting Corporation also made a survey in connexion with a television programme on " The hurt mind " in 1957. Another possible study is that of popular and legal terms applied to the mentally ill. Legislative measures themselves are also often an interesting pointer to community attitudes to mental disease—although such measures are usually out of date in relation to medical practice and public opinion. Finally, the way in which the care of mental patients is organized may also partially reflect the community's attitude.

* Expert Committee on Mental Health (1959) *Seventh report : Social psychiatry and community attitudes* (*Wld Hlth Org. techn. Rep. Ser.* No. 177), 40 pages. Price: 1/9, $0.30, or Sw. fr. 1.—. Also published in French and Spanish.

[1] Members of the Committee: Dr S. Betlheim, Yugoslavia; Dr R. H. Felix, USA (Chairman); Dr R. H. Hazemann, France; Dr M. S. Jones, United Kingdom (Rapporteur); Dr T. A. Lambo, Nigeria (Rapporteur); Dr A. Manugian, Lebanon; Dr P. Sangsingkeo, Thailand (Vice-Chairman); Dr F. Quiros, Costa Rica. Secretariat: Dr E. E. Krapf, WHO (Secretary); Dr O. Klineberg, USA (Consultant); Dr Maria Pfister, WHO.

Society's reactions to the mentally ill—whether favourable or unfavourable—are governed by a number of factors. Ideas with regard to mental diseases and their causes are often confused: some may believe that a mental patient is possessed by a devil, and in this case it is the devil that is detested and not the patient. If the disease is considered to be hereditary there is a certain hostility to the patient; if, on the other hand, it is believed to be due to some physical cause, he is more readily accepted. There is the fact that what is considered as normal behaviour in one society may be taken as abnormal in another—mental abnormalities may even be subject to " fashion ". The community also reacts in different ways, understandably, according to whether the patient is violent and agitated, or calm and reserved. Community reactions vary too according to the clinical nature of the disorder. Schizophrenia inspires fear and makes people hostile. The neuroses are better tolerated and may even be viewed with sympathy. The public protects itself against psychopaths by restrictive or punitive measures. Mental defectives are generally regarded with indulgence if not too much is expected of them, but the attitude may become hostile if they are a burden upon society. The same opposing reactions are noted with regard to abnormal children. If they are feeble-minded or mentally retarded they are pitied as simpletons, but if they suffer from behaviour disorders they are considered to be responsible and are judged severely. In developing societies the mental abnormalities of old people are less readily accepted than in others, but this attitude is gradually changing.

In addition to the actual structure of a community, its social and economic level also affects one way or another the attitude to the mentally ill—according to whether such persons are a burden upon the community or not. The religion and educational system of a community, and above all, its legislation, also have an influence. If the main purpose of the legislation is to protect the community, it necessarily implants the idea of punishment with respect to mental disease; if, on the other hand, it aims at ensuring suitable treatment for mental patients—if, for example, it provides for voluntary admission to psychiatric establishments—it elicits a favourable reaction from the community, mental patients being really regarded as sick persons in need of treatment.

Once community attitudes to mental patients and the reasons for them are known, community attitudes to psychiatry in general —to psychiatric establishments, to the different types of psychiatric treatment, and to psychiatric personnel—require study. If the first task of psychiatry is considered to be isolation of the mental patient and prevention of harm to the community from him, the community will have very little inclination to participate in any way in his treatment or rehabilitation. The psychiatric hospital is, however, now increasingly recognized as a treatment centre—and the successes achieved by modern therapy are very largely responsible for this revised concept. The public is also becoming more and more attuned to the idea of the " open " hospital, of extra-hospital treatment and of reception centres for mental patients, and the out-patient clinics in particular are playing a more important role not only in the treatment of mental patients but also in the change in the community attitude to psychiatric activities.

It is also of value to study community attitudes to different types of treatment. One thing seems certain: the present more favourable attitude to psychiatry seems to be due, at least in part, to the fact that mental patients now receive somatic treatment in the same way as other sick people and such treatment often gives rapid and remarkable results. Psychotherapy, although still something of a mystery to many people, is now fairly easily accepted, and at times even has a certain snob value. Social and occupational therapy have also helped greatly to change public opinion about psychiatry; they have shown that many patients can be socially rehabilitated and participate to some extent in the economic activities of the community. Nevertheless, the problems connected with this readaptation and economic activity are difficult, for they are dependent upon the sufferance of the social group into

which the patient is to be reintegrated and of his potential employer. The mere fact of having been mentally ill may prejudice chances of employment. If the patient is protected by appropriate legislation, the difficulties are less. In Britain, for example, mental patients and the physically disabled are cared for under a system of rehabilitation organized by the Ministry of Labour; factories or workships are reserved for the seriously disabled and there are 14 industrial rehabilitation centres which take mentally ill patients who are still in hospital.

The more favourable community attitude to psychiatric institutions and treatment is accompanied by less hostility to psychiatric personnel. The hostility—or even fear—which the psychiatrist formerly inspired was probably due to the circumstances in which he worked: the absence of effective treatment, patients interned in prison-like hospitals, etc., all of which were bound to provoke mistrust and hopelessness. Nowadays, the creation and development of psychiatric services within the general hospitals and the development of out-patient clinics have brought the psychiatrist closer to the community and made him known as a physician who treats and cures sick people.

This improvement in the community attitude to psychiatry is therefore the first aim of social psychiatry, but it is an aim that can only be achieved by developing active forms of treatment that can be applied without segregation of patients, by making psychiatric activities an integral part of general public health work—or at least by co-ordinating them with it—and by informing and educating public opinion.

The public must be informed, but gradually and with discretion, bearing in mind that unsuitable or ambiguous language may create a wrong impression; an approach must be made to selected groups with whom special points can be discussed. Whatever the method chosen, as a general rule the greatest caution must be exercised.

The educators, if they are to be successful, must be adequately trained and made to understand the general principle that the subject of mental health is highly charged with emotion. The psychiatrist should be in a position to devote a considerable part of his time to improving the professional skills of those who work with him (nurses, social workers, etc.). Physicians, whether they work in the hospitals, in the public health services, or in private practice, have an important role to play, if only on account of their daily contact with people. In short, if the community attitude to the mentally ill is to be altered, all those who carry any kind of responsibility must play a part: those who draw up laws and those who see that they are applied; leaders in the industrial world; ministers of religion, teachers, the press, the radio and, of course, the family—for the education of parents is an extremely important factor in the modification of community attitudes. It is they who will form the social conscience of future generations, and, if they really understand mental illness within their own family and participate in its treatment, will be able to influence other families which may be showing mistrust or hostility.

The report concludes by indicating the kind of research that should be undertaken in order to improve the information and education of the public. It expresses the opinion that in addition to study of community attitudes to mental disorders, mental treatment and psychiatric personnel, there should be investigation of the role played by geographical environment, historical development, cultural patterns, religion, socio-economic class and education. A linguistic analysis of popular terms used for mental illness might be of value and throw some light on community attitudes.

A special study should be made of information and education techniques and of methods of training psychiatric personnel.

Social psychiatry assumes that the mental patient can be restored to a more complex social background, and that mental disease can be cured and prevented by creating opportunities for favourable social contacts. These two assumptions cannot be verified, however, unless the community accepts mental illness and maintains its contact with the mentally ill as it does with other illness or ill persons.

Notes and News

DDT water-dispersible powders: specifications and stability

Water-dispersible powders containing 75% DDT have proved to be among the most useful weapons in the fight against malaria. The suspension properties of these powders have, however, often been unsatisfactory owing to poor formulations or inadequate packaging. A recent article in the WHO Bulletin [1] deals with the specifications evolved by the United States International Cooperation Administration (ICA) for powders used in ICA-supported malaria control or eradication programmes, many of which are carried out in conjunction with similar WHO programmes in the same countries.

The first specification concerns packaging: for this, fibre drums with hermetically sealed plastic linings are recommended. A suspensibility test is specified, the minimum coefficient of suspensibility (percentage of DDT in suspension after 30 minutes) being fixed at 1.5 before and 1.2 after treatment in simulated tropical conditions. The specifications for the inspection of powder purchased by ICA require a composite sample of each 50 tons to be taken for inspection. The coefficients of suspensibility before and after testing are in general higher than the specified minimum. Despite this sampling, however, deficient material has been found in some shipments. It was found that if satisfactory and unsatisfactory batches are mixed the suspensibility of the mixture tends towards that of the satisfactory material. This explains why the method of taking composite samples has sometimes failed to detect unsatisfactory batches, and provisions to remedy this situation have now been incorporated in the specifications.

Another article in the same number of the Bulletin [2] deals with the storage stability of DDT water-dispersible powders. It describes a study of the change in suspensibility of two series of 75% DDT water-dispersible powders during storage in simulated commercial packages at 27°C, 50°C and 65°C, and as "shelf" samples at ambient temperatures. All the products tested in both series were made under the conditions of regular commercial production, and those in the second series were prepared in 1954 for the ICA, according to ICA specifications. The results showed that: (*a*) a high initial suspensibility is no criterion of "shelf" life; (*b*) the measure of suspensibility after the so-called "tropical storage pre-treatment" is no criterion of stability, except perhaps in the case of very poorly formulated products; (*c*) periodic observations, made over a month or more, of the suspensibility of powders stored in commercial or simulated commercial packages at 50°C and 65°C will provide an indication of the probable long-term stability of these products; and (*d*) it seems likely that a reasonable estimate of long-term storage stability at ambient temperatures could be obtained by subjecting the samples to high temperatures for a very short period.

Factors affecting the suspensibility of DDT water-dispersible powders are discussed in the note that follows.

Suspensibility of DDT and dieldrin water-dispersible powders

Experiments to determine the effect of moisture, temperature and pressure on the suspensibility of DDT water-dispersible powders are described in a recent number of the WHO Bulletin.[3] It was found that the removal of moisture brought about a slight increase in suspensibility; that heating for one hour at temperatures below 70°C resulted in an increase in suspensibility, due probably to the drying effect of the heat, whereas heating for the same

[1] Pearce, G. W., Gooden, E. L. & Johnson, D. R. (1959) *Bull. Wld Hlth Org.*, 20, 913

[2] Pearce, G. W., Goette, Mary B. & Sedlak, V. A. (1959) *Bull. Wld Hlth Org.*, 20, 921

[3] Miles, J. W. et al. (1959) *Bull. Wld Hlth Org.*, 20, 937

period at temperatures above 70°C resulted in a decrease; that on prolonged heating at 70°C and 75°C the suspensibility decreased sharply in the first 4 hours but thereafter showed little change up to 20 hours; and, finally, that low pressures—for example, 25 g per cm^2—had little effect on the suspensibility, but that, at pressures of 100 pounds per square inch and over, it varied in inverse proportion to the logarithm of the pressure.

The same number of the Bulletin [1] contains an account of experiments in which various dieldrin water-dispersible powder formulations were subjected to high temperature storage and the effect on their suspensibilities compared. Of two products furnished by the Shell Chemical Company, each containing 50% dieldrin with Attaclay as diluent, AC 1630 is recommended rather than AC 1631 on the basis of superior performance after storage at 50°C and 65°C. In a similar series of tests on 75% dieldrin water-dispersible powders, Shell formulation AC 1621, which contains Hi-Sil as diluent, was judged better than AC 6621, which contains Micro-Cel as diluent. A series of samples of AC 1621 was subjected to temperatures of 90-120°C for periods of 1-20 hours and the effect on suspensibility determined. Most samples withstood the treatment reasonably well at temperatures up to 110°C for 20 hours.

Insecticides and pesticides

The resistance of insects to DDT, dieldrin and other modern insecticides seriously complicates the fight against the insect-borne diseases such as malaria, typhus and yellow fever. So far, some 50 species of insects—including flies, mosquitos, roaches, bed-bugs, lice and ticks—are reported as being resistant in various parts of the world to one or more insecticides.

A WHO Expert Committee on Insecticides met in Geneva from 14 to 19 September to discuss developments in this field over the past two years. Resistance by anopheline mosquitos to various insecticides in different parts of the world was reviewed; thanks to tests already developed it is now possible to have a fairly complete picture of the extent and nature of this resistance. The Committee defined tests for physiological resistance in other insects, including bed-bugs, fleas and sandflies, proposed a test for determining behaviouristic resistance in adult mosquitos, and made detailed recommendations on insect control measures based on the latest insecticide research and field experience, and on measures for the control of pests such as rats, mice and scorpions. Means of testing the effectiveness of insect control methods used in aircraft were also discussed.

An account of the Committee's work will be published in the Chronicle when its report appears.

Radiation in the treatment of cancer

A study group, convened jointly by the International Atomic Energy Agency (IAEA) and WHO, met in Vienna from 3 to 5 August 1959 to discuss radioisotope teletherapy and the use of supervoltage radiation in medicine. Teletherapy is a treatment, mainly against malignant tumours, which uses a beam of gamma rays from a large source of radioactive material situated at a certain distance from the patient; the "cobalt bomb" employing the isotope cobalt-60 is the best-known application of this method. Supervoltage is a term applied to energies exceeding one million electron volts; supervoltage radiation, also employed in the treatment of cancer, uses high energy X-rays and beams of particles emanating from accelerators.

The group was of the opinion that these forms of radiotherapy are of definite value in the treatment of cancer, though further studies are needed on the radiation doses to be applied in clinical practice, as well as the standardization of methods and their clinical evaluation. One of the principal requirements at the present stage is specialized training in the techniques of radiotherapy, and the group recommended more training programmes, exchanges of experts, and visits to radiotherapy centres in various countries.

The group consisted of 20 radiotherapists and radiation physicists from Canada, France, Germany, Hungary, Italy, Japan, Mexico, Sweden, Switzerland, the United Kingdom, the USA and the USSR.

[1] Pearce, G. W., Miles, J. W. & Goette, Mary B. (1959) *Bull. Wld Hlth Org.*, **20**, 947

Third International Reference Preparation of Cardiolipin

The Third International Reference Preparation of Cardiolipin has just been established, following comparative studies with the Second Standard, the supply of which is approaching exhaustion. It is kept at the WHO Reference Centre, Statens Seruminstitut, Copenhagen.

In a recent number of the WHO Bulletin,[1] P. Krag & M. W. Bentzon describe the tests and analyse the results obtained in four laboratories in three different countries.

This preparation is intended to serve as a reference for the evaluation of cardiolipins produced by national laboratories or coming from other sources. A cardiolipin may be used in serological tests for syphilis if, having passed chemical tests (phosphorus, nitrogen and iodine value), it shows the same reactivity as the International Reference Preparation of Cardiolipin combined with the International Reference Preparation of Egg Lecithin and a good cholesterol. A valid comparison must include testing on reactive and non-reactive sera, such testing to extend over several days. The reactive sera should be tested in a dilution series closer than twofold and each antigen should be tested in duplicate. Any difference between the cardiolipin under test and the International Reference Preparation can be accepted only if it is of the same magnitude as the differences found between two cardiolipin antigens both composed of the International Reference Preparations and in the same proportions.

Organo-phosphorus dry sugar baits in fly control

The use of organo-phosphorus dry sugar baits —which are cheap, easy to apply, and present comparatively little risk for domestic animals— has proved extremely successful in the control of houseflies in the United States, achieving up to 98% reduction of fly populations in 24 hours. The method has been shown to be particularly effective against *Musca domestica*. As this species is the major cause of the fly problem in Israel, it was decided to carry out comparative tests with dry sugar baits in rural areas in that country. The results are described in a recent number of the WHO Bulletin.[2]

The toxicants chosen for testing were mostly mixed with sugar, or sugar and sand, and scattered from shaker cans. Malathion 2.5%, diazinon 1%, and Dipterex 1% gave equally effective results. Chlorthion 1% and malathion 1% and 2%, used in smaller quantities, were less effective. The value of the method was found, however, to depend on the extent of the breeding sources. In certain farm buildings, for instance, where garbage and manure attract flies and encourage dense breeding, the baits may not be sufficiently enticing to ensure the destruction of a large proportion of the fly population. In such cases, unless the use of the baits is accompanied by a serious attempt to improve sanitation, it is to be discouraged, for not only will it fail to overcome the basic problem, but it may hasten resistance to the insecticide employed. Organophosphorus sugar baits should therefore be used as the principal control method only in buildings which are not too highly infested; otherwise the bait method should be secondary to sanitation measures.

Public health administration in the USSR

Under the auspices of the WHO Regional Office for Europe, a group of senior public health administrators from 25 European countries took part in a travelling seminar in the USSR from 15 September to 17 October 1959. The participants studied public health administration in various parts of the country, including Moscow, Leningrad, Minsk, Kiev, Yalta, and Stalingrad. The programme included visits to medical institutions, medical schools and research establishments; to health services in cities, rural areas, and factories; and to sanatoria and spas.

The following countries were represented at the seminar: Albania, Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Monaco, Morocco, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and Yugoslavia.

[1] *Bull. Wld Hlth Org.*, 1959, 20, 1193

[2] Rosen, P. & Gratz, N. G. (1959) *Bull. Wld Hlth Org.*, 20, 841

Expert Committee on Tuberculosis

Tuberculosis is today a problem in every country of the world; in fact, following the successful control of many other communicable diseases, its relative importance has increased in recent years. Although a WHO Expert Committee met in 1953 to discuss tuberculosis vaccination,[1] there was no general discussion of tuberculosis by a WHO Expert Committee between 1950 [2] and this year. In the meantime, WHO has taken an active part in tuberculosis programmes in all parts of the world, and much new knowledge on tuberculosis has been accumulated. Of particular importance is the introduction of effective and inexpensive anti-tuberculosis drugs which can be used for mass chemotherapy on a domiciliary basis; this has brought control of tuberculosis within the reach of almost any country.

A WHO Expert Committee on Tuberculosis met in Geneva, from 28 September to 3 October, to review all aspects of the Organization's anti-tuberculosis programme, the main subjects of discussion being: measurement of the extent of the tuberculosis problem; factors influencing the epidemiological behaviour of tuberculosis; methods for examination for pulmonary tuberculosis; preventive measures; treatment; case-finding; organization of a tuberculosis programme; and the functions of WHO in a world-wide tuberculosis programme.

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1954, **88**
[2] *Wld Hlth Org. techn. Rep. Ser.*, 1951, **32**

People and Places

Tuberculosis chemotherapy

The tuberculosis chemotherapy project in Madras, India, was started in 1955 and is sponsored jointly by the Indian Government, the Madras Government, the Indian Council of Medical Research, the Medical Research Council of Great Britain, and WHO. Its aim is to compare the results of domiciliary and institutional treatment of tuberculosis, and to investigate the effect of the drugs used in domiciliary treatment.[1] Dr J. Angel, who was recently appointed to the team working on this project, was educated at St John's College, Cambridge, and University College Medical School, London. He has had wide experience, both in the United Kingdom and the United States of America, of the medical care of tuberculosis patients, and of undergraduate and post-graduate teaching.

A WHO-assisted tuberculosis chemotherapy project was recently started in Tunis. Dr Derrick Foskett, who is in charge of the project, was educated at Cambridge University and at St Thomas's Hospital, London, and has worked with the tuberculosis services in South Africa and the public health service of Kenya, as well as in India and the Eastern Mediterranean Region. Before taking up his appointment with WHO, he was consultant chest physician to the Oxford Regional Hospital Board, physician to Peppard Chest Hospital, Henley-on-Thames, clinical assistant at Brompton Hospital, London, and BCG officer for the Oxford region.

Nutrition adviser for South-East Asia

Dr Ratko Buzina has been appointed nutrition adviser for the South-East Asia Region of WHO. In this capacity he will assist governments in planning national nutrition programmes, supervise and evaluate nutrition projects of the Region, and be responsible for keeping the Regional Office in touch with Headquarters on nutritional matters.

A graduate of the Medical School of the University of Zagreb, Dr Buzina has had post-graduate training at the University of Basle, Switzerland, and at the University of Minnesota, USA. He has been head of the health service in Croatia, Yugoslavia, and of the Division of Physiology of Nutrition, Central Institute of Hygiene, Zagreb.

[1] For further details on this project, see the article on page 397.

Dental education in Indonesia

Professor J. C. Middleton Shaw was recently appointed WHO consultant in dental education to the Faculty of Dentistry at Airlangga University, Surabaya, Indonesia. He will advise the faculty on methods of developing the structure and organization of dental education, and will also act as adviser to the Indonesian Government on the improvement of such education.

Professor Middleton Shaw was for many years Dean of the Faculty of Dentistry, University of Witwatersrand, Johannesburg, Union of South Africa, and was a member of the National Health Council, the Council for Scientific and Industrial Research and the Medical and Dental Council of that country.

Malaria field appointments

The failure to control malaria with dieldrin in Liberia led in 1957 to a reorganization of the WHO-assisted malaria programme in that country. The disappointing results of the malaria control project were found to be mainly due to the habits of *Anopheles gambiae*, to its resistance to dieldrin, and to transport difficulties in the dense forest areas. A WHO team, with headquarters in Kpain, was therefore set up to seek means of overcoming these obstacles and of achieving interruption of transmission. Dr. R. O. Darwish, of the United Arab Republic (Province of Egypt), was recently appointed to the team as entomologist. He holds a Ph. D. in entomology from Edinburgh University, and has also studied parasitology and entomology at the London School of Hygiene and Tropical Medicine and the Istituto Superiore di Sanità, Rome. He has served with the Egyptian Ministry of Public Health as field officer in a campaign for the eradication of *A. sergenti*.

Since August 1956, WHO and UNICEF have been helping the Government of Afghanistan to consolidate its malaria control campaign and to convert it gradually into a nation-wide eradication campaign. Dr S. L. Dhir, of India, who has been appointed to this project as senior WHO malariologist, was until recently Regional Deputy Director in the Indian Malaria Co-ordination Organization, Cuttack, with responsibility for malaria operations in an area with a population of 60 million. He is familiar with malaria work in Afghanistan, where he has already served as a WHO expert; he has also served with the WHO-assisted malaria project in Indonesia.

Staffing requirements for hospital nursing services

A guide on staffing requirements for hospital nursing services is being prepared by WHO with the assistance of Miss Marguerite Paetznick, Director of Nursing Service, Denver Department of Health and Hospitals, Colo., USA. In connexion with this assignment, she will visit certain countries in the Eastern Mediterranean Region where she will study factors influencing nursing service administration.

A graduate of the University of Minnoseta, Miss Paetznick holds a Master's degree in nursing from the University of Washington, Seattle. She has wide experience of nursing administration and served for three years on the Commission for the Care of the Patient, sponsored by the American Medical Association, the American Hospital Association, and the American Nurses' Association.

WHO Area Representative in Ceylon

Dr T. C. Puri, who for the past two years has been WHO Area Representative in Burma, has now been assigned to Ceylon in the same capacity. He will have the task of maintaining contact between the Government of Ceylon and the WHO Regional Office for South-East Asia for the development and implementation of WHO assistance to the country's health programmes. He will also strive to obtain the maximum co-ordination between the work of WHO in Ceylon and that of other international agencies concerned with public health. At present, WHO-assisted programmes in Ceylon include: rural health, environmental sanitation, nursing education, health statistics, physiotherapy, and the training of laboratory technicians.

A former Deputy Director-General of Health Services in the Government of India, Dr Puri has also served as Secretary of India's Central Council of Health and as a member of the governing body and executive committee of the Indian Council of Medical Research.

Research on iron deficiency anaemia

A preliminary survey is being made of the facilities of centres in which research on iron deficiency anaemia will be carried out under

WHO's programme of international medical research.

Dr M. M. Wintrobe, Professor and Head of the Department of Internal Medicine and Director of the Laboratory for Study of Hereditary and Metabolic Diseases, University of Utah, will conduct the initial survey of centres in Latin America. Dr Wintrobe is a leading haematologist and has had extensive experience in clinical and experimental nutrition.

Hospital construction and planning

An expert on hospital construction and planning—Mr W. F. Vetter—is at present visiting a number of countries in Africa to advise governments on their problems in this field. This mission was organized by the WHO Regional Office for Africa after inquiry among the governments of Member States. Early this year, Mr Vetter visited Basutoland, the Federation of Rhodesia, and Nyasaland, Swaziland and Mozambique. Since then, he has visited Angola and Nigeria, and paid a second visit to Mozambique; he will subsequently visit Uganda, the Seychelles and Zanzibar.

A well-known Swiss architect, Mr Vetter is Secretary-General of the International Union of Architects. He has carried out several assignments for WHO in the European, Eastern Mediterranean and Western Pacific Regions, and last year, on the recommendation of WHO, undertook hospital planning for the Government of Ghana. He is a member of the WHO Expert Advisory Panel on Organization of Medical Care.

Control of venereal diseases

Dr E. I. Grin, of Yugoslavia, has been appointed WHO consultant to the venereal disease control project started in the Sudan several years ago, under the auspices of the WHO Regional Office for the Eastern Mediterranean. Dr Grin has been a member of the WHO Advisory Panel on Venereal Infections and Treponematoses and has served as WHO adviser on yaws control in Thailand for two years. He has also served as director of the endemic non-venereal syphilis eradication programme which was completed in Yugoslavia five years ago.

Urbanization survey

Professor G. A. Canaperia, Director of International and Cultural Relations, Office of the High Commissioner for Hygiene and Public Health, Italy, is WHO representative on a United Nations mission which is studying urbanization problems in Athens, Cairo and Casablanca. The mission will examine the possibility of joint action in this field by the United Nations and specialized agencies. As a representative of the Italian Public Health Administration, Professor Canaperia has been associated with WHO since its foundation; he has served on the WHO Executive Board many times and was its Chairman at the eighteenth and nineteenth sessions (1956-1957).

Headquarters appointment

Dr Maria Pfister, Medical Officer, Mental Health, WHO Headquarters, who has been granted a year's study leave, will be replaced from September to November 1959 and from May to August 1960 by Professor Tsung-yi Lin, of China (Taiwan). A graduate of Tokyo and Harvard Universities, Professor Lin holds the Chair of Neurology and Psychiatry at Taiwan University, Taipeh. He is a member of the WHO Expert Advisory Panel on Mental Health, and has taken part in the work of several WHO study groups and expert committees. While at WHO Headquarters, he will co-operate in the planning of surveys and inter-regional conferences on the epidemiology of mental disorders, as well as in the general activities of the Mental Health unit.

Review of WHO Publications

Water Supply for Rural Areas and Small Communities, by E. G. Wagner and J. N. Lanoix, Geneva, 1959 (*World Health Organization: Monograph Series*, No. 42), 337 pages. Price: £1 15s., £6.75, or Sw. fr. 20.—. French and Spanish editions in preparation.

During the past century the relationship between water, its bacteriological quality, and the incidence of certain communicable diseases was first noticed and investigated, with the result that in many countries the provision of as abundant a supply as possible of safe, treated water became a normal public service. Standards of water quality (see, for example, the WHO publication *International Standards for Drinking-Water* [1]) and criteria for optimum water distribution have since been established, but over large areas of the world the application of these standards is often limited by economic considerations. Illness and death from water-borne diseases thus tend to occur chiefly in those countries which can least afford the resultant economic loss. The provision of wholesome water for under-developed areas and small communities is an international health problem which demands attention: the World Health Organization therefore invited the authors to undertake the preparation of this monograph, which also incorporates the comments of some forty experts in different parts of the world to whom the manuscript was circulated. The opinions it expresses are thus based upon very wide experience, and should be of use to public health administrators, medical officers of health, civil and sanitary engineers, and sanitarians faced with the task of supplying safe water in circumstances of varying difficulty.

[1] World Health Organization (1958) *International standards for drinking-water*, Geneva

The diseases transmitted through water fall largely among the enteric bacterial infections—typhoid and paratyphoid fevers, bacillary dysentery, cholera—but water plays a part in the epidemiology of amoebiasis, and also indirectly in the transmission of such diseases as malaria, filariasis and schistosomiasis. It is, moreover, sometimes responsible for the transmission of brucellosis, tularaemia, haemorrhagic jaundice, and several other protozoal and virus infections. It seems clear that the significant improvements in health accompanying the consistent use of safe water for drinking and for domestic and personal hygiene can be achieved only if treated water is made readily available in the home, rather than merely carried to a public faucet. Water systems based on this ideal are of course expensive and often almost impossible of immediate achievement; and in under-developed or rural areas a compromise is invariably necessary between economic realities and public health aspirations. This monograph attempts to clarify the various factors to be taken into account in the long-range planning and design of such water systems.

Detailed advice is given on the planning of a water-supply project, ranging from its first conception within the general programme of a central health administration, the balancing of aims and resources, the allocation of money, technical facilities and personnel, the topographical investigations necessary to determine its feasibility, the choice of treatment methods, the detailed engineering design, and finally the practical aspects of construction and operation.

A large section of the volume is devoted to a comprehensive discussion of the installation of various types of water-supply systems, exploiting either ground water or surface water. The former involves the construction

of wells and the use of pumps, both of which subjects are dealt with in great detail and profusely illustrated. The utilization of surface water collected in cisterns, catchment areas, dams, etc., is then considered. Its quality is usually less satisfactory than that of ground water, so that treatment is almost always necessary. This factor must largely govern the choice between the two basic types of rural water system, as the construction and maintenance of a water-treatment plant is a complex and costly undertaking, and if it is not well run such a plant may merely contribute to the rapid spread of water-borne epidemics. The methods of treatment examined are sedimentation, filtration, aeration, corrosion control, and chlorination; household purification of water is also described in some detail. Water-distribution systems for rural areas are essentially similar to those for urban communities, differing mainly in the standards and assumptions upon which engineering designs are based. Suggestions are made on methods and standards of water storage, on the selection of pipes and other service connexions, and on special problems such as the installation of hydropneumatic systems.

Finally, the authors discuss the theory and practice of the management of small water-supply systems. Specific advice is given on personnel and training (emphasizing the value of short courses, in-service training programmes and correspondence courses for countries where experienced staff is not immediately available), on administration and finance (in particular, ways of circumventing the difficulties involved in collecting water fees in under-developed communities), on operation and maintenance, and on the elaboration of long-range plans for water service. The nine annexes give much useful construction data, both textual and illustrative, and a brief bibliography indicates the main sources of further information.

The authors hope that this critical examination of the technical and administrative factors contributing to the success of water-supply programmes will stimulate their development at the local level in Member States of WHO.

Pharmacopoea Internationalis, Editio Prima, Supplementum, Geneva, 1959, xx+224 pages. Price: £1. 5s., $5, or Sw. fr. 15.—. Published also in French. Spanish edition in preparation.

The first edition of the International Pharmacopoeia, volumes I and II of which appeared in 1951 and 1955, has just been completed by the publication of a supplement containing a further 94 monographs and 17 appendices.

The monographs include specifications for some hormone preparations, antimalarials, and antibiotics not given in the earlier volumes, for the contrast media acetrizoic acid and iopanoic acid, and for certain pharmaceutical forms of the antibiotics described in volume II.

As in volumes I and II, the appendices contain lists of reagents, tables of doses, and descriptions of assay methods. In addition, they deal with various subjects not covered in the previous volumes—for instance, the preparation of buffer and isotonic solutions, the determination of pH and of resistivity, and the testing of glass containers for injections. They also include a revised list of International Biological Standards and Reference Preparations and a list of so-called "authentic chemical substances", that is, substances needed for reference purposes which can be characterized by physico-chemical methods.

Some amendments to volumes I and II are presented in an annex and, finally, a detailed index to the whole of the first edition is provided.

A number of preparations introduced into therapeutics in the last few years have been included in the Supplement. It can therefore be said that the complete first edition of the International Pharmacopoeia deals with a large proportion of the new pharmaceutical preparations as well as with most of the classical therapeutic substances, and describes many general methods of quality control in addition to presenting tables of dosage.

The International Pharmacopoeia "constitutes a collection of recommended specifica-

tions, which are not intended to have legal status as such in any country, but are offered to serve as references so that national specifications can be established on a similar basis in any country ". It is intended to be of use to all national and other authorities dealing with specifications for pharmaceutical preparations, as well as to manufacturing firms and laboratories dealing with the quality control of such products.

* * *

The pharmaceutical and medical press on Pharmacopoea Internationalis, Volumes I and II

- " This book is a milestone in human progress."

  American Journal of the Medical Sciences

- " An outstanding achievement."

  Journal of the Royal Institute of Chemistry

- " This outstanding work . . . is undoubtedly the greatest advance towards international unification of terminology, strengths, and composition of pharmaceutical substances since the dawn of this era of modern medicine."

  The Syracuse Chemist

- " This book should be particularly useful in those countries in which pharmacopoeias need revision. It is also likely to be of considerable service in any country that does not have a national compendium of standards and tests for drugs."

  Journal of the American Medical Association

- " It is a work of great simplicity and common sense and must succeed in its purpose."

  Bulletin of the Johns Hopkins Hospital

- " The publication for the first time of an International Pharmacopoeia must indeed be regarded as a historic event and a triumph for the committee of international experts who have at last overcome the difficulties of its presentation."

  The Analyst

- " The International Pharmacopoeia has been most carefully prepared and produced . . . It deserves a high measure of success."

  Tropical Diseases Bulletin

- " In preparing this work WHO has rendered an incalculable service to Pharmacology all the world over, but especially in those countries which have not developed a pharmacopoeia of their own. Only in the future will the real measure of its importance be manifest."

  Journal of the Royal Institute of Public Health and Hygiene

TUBERCULOSIS

Introduction

Epidemiological basis of tuberculosis eradication in an advanced country—*E. Groth-Petersen, Jørgen Knudsen & Erik Wilbek*

A concurrent comparison of home and sanatorium treatment of pulmonary tuberculosis in South India—*Tuberculosis Chemotherapy Centre, Madras*

BULLETIN OF THE WORLD HEALTH ORGANIZATION

Vol. 21, No. 1 (1959), 144 pages

Price: 10/— $2.00 Sw. fr. 6.—